# Avalon Channel – Newfoundland Temperature, Salinity and Sigma-t Sections

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June 1983

Canadian Technical Report of Hydrography and Ocean Sciences No. 24

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## Rapport technique canadien sur l'hydrographie et les sciences océaniques

Ces rapports contiennent des renseignements scientifiques et techniques qui constituent une contribution aux connaissances actuelles mais que l'on ne trouve pas normalement dans les revues scientifiques. Le sujet est généralement rattaché aux programmes et intérêts du service des Sciences et Levés océaniques (SLO) du ministère des Pêches et des Océans.

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Les rapports techniques sont produits à l'échelon régional mais sont numérotés et placés dans l'index à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement auteur dont le nom figure sur la couverture et la page de titre. Les rapports épuisés seront fournis contre rétribution par des agents commerciaux.

Les établissements des Sciences et Levés océaniques dans les régions et à l'administration centrale ont cessé de publier leurs diverses séries de rapports depuis décembre 1981. Vous trouverez dans l'index des publications du volume 38 du *Journal canadien des sciences halieutiques et aquatiques*, la liste de ces publications ainsi que le dernier numéro paru dans chaque catégorie. La nouvelle série a commencé avec la publication du Rapport n° 1 en janvier 1982.

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Hydrography and Ocean Sciences No. 24

June 1983

# AVALON CHANNEL - NEWFOUNDLAND TEMPERATURE, SALINITY AND SIGMA-T SECTIONS

by

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Cat. No. Fs 97-18/24E ISSN 0711-6764

Correct citation for this publication:

Lively, R.R. 1983. AVALON CHANNEL - Newfoundland temperature, salinity and Sigma-t sections. Can. Tech. Rep. Hydrogr. Ocean. Sci. 24: v + 65p.

## Abstract

Lively, R.R. 1983 Avalon Channel - Temperature Salinity and Sigma-t sections. Can. Tech. Rep. Hydrogr. Ocean Sci. 24: v + 65p.

The temperature, salinity and density data that were collected off the coast of Newfoundland in the Avalon Channel area by the CSS Dawson during the cruises 80-019 (June 18 to July 3, 1980) and 80-034 (October 22 to October 29, 1980) are presented in this report as oceanographic sections.



## Resume

Lively, R.R. 1983 Avalon Channel - Temperature Salinity and Sigma-t sections. Can. Tech. Rep. Hydrogr. Ocean Sci. 24: v + 65p.

Dans le présent rapport, on présente, sous forme de sections relatives à l'océanographie, les données sur la température, la salinité et la densité que le Dawson a recueillies au large de Terre-Neuve, dans la région du chenal Avalon, au cours des expéditions 80-019 (du 18 juin au 3 juillet 1980) et 80-034 (du 22 au 29 octobre 1980).

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**OCEANOGRAPHIC SECTIONS**


| STATIONS | PAGES | | |
|---|---|---|---|
| | TEMPERATURE | SALINITY | SIGMA-T |
| 1-9 (8-019) | 11 | 12 | 13 |
| 10-19 (8-019) | 15 | 16 | 17 |
| 44-49 (80-019) | 19 | 20 | 21 |
| 50-60 (80-019) | 23 | 24 | 25 |
| 60-66 (80-019) | 27 | 28 | 29 |
| 66-75 (80-019) | 31 | 32 | 33 |
| 75-84 (80-019) | 35 | 36 | 37 |
| 1-7 (80-034) | 39 | 40 | 41 |
| 7-13 (80-034) | 43 | 44 | 45 |
| 13-19 (80-034) | 47 | 48 | 49 |
| 13-24 (80-034) | 51 | 52 | 53 |
| 25-30 (80-034) | 55 | 56 | 57 |
| 31-36 (80-034) | 59 | 60 | 61 |
| 37-47 (80-034) | 63 | 64 | 65 |

## INTRODUCTION

Dawson cruises 80-019 and 80-034 were undertaken to study the effects of the fresh water runoff from the Labrador and Arctic regions on the physical oceanography of the Newfoundland Shelf. Coastal sea level and hydrological properties respond annually to the arrival of the fresher water pulse in Avalon Channel during late summer (Petrie and Anderson, 1983). Operations during cruise 80-019 (June 18 to July 3, 1980) consisted of the deployment of a mooring array and hydrographic sections to determine property distributions before the arrival of the fresher water pulse. Marked changes of temperature, salinity and velocity structure occur with the arrival of the leading edge of the fresher water pulse and a more gradual modification of water properties, such as decreasing salinity takes place over the following months. Cruise 80-034 (October 22 to October 29, 1980) surveyed the region for changes in hydrographic properties after the arrival of the fresher water pulse.

This report presents the oceanographic sections (temperature, salinity, sigma-t) from cruises 80-019 and 80-034. The other data collected by the Dawson on these two cruises is being analysed by Anderson (1983, in prep.). Cruise 80-019 was the combination of two studies, the Avalon Channel and the Flemish Cap. The CTD stations (numbers 20-43) will be published in another report being prepared by C.K. Ross (1983).

## DATA REDUCTION

The CTD casts were made using the Guideline Mark II analog CTD mounted on a rosette with two bottles. A pinger was also mounted on the rosette cage which allowed the water column to be sampled to within a few meters of the bottom. The CTD was lowered and raised at a speed of 1 m/s. The data from the CTD were logged on a Hewlett Packard 21MX computer, using Coastal Oceanography's version of the Metrology RTE4 system software. The two bottles were tripped mostly near the bottom of the profile for calibration purposes. At times, when the gradients were too large near the bottom, one bottle would be tripped in the upper layer where the water properties were more uniform. Temperature calibrations were made using the Richter and Wiese, Yashino or Kurt Gohla reversing thermometers attached to one of the bottles.

The raw data consisted of pressure, temperature and conductivity measurements and were stored on nine track magnetic tape. These data were later run on the Cyber 171 at Bedford Institute using the CMSYST CTD software package. This software package uses the UNESCO formula (Perkin and Lewis, 1980) to calculate the salinity from conductivity, temperature and pressure.

The values of temperature and salinity obtained from the rosette samples were used for the in situ calibration. The salinity determinations were made with an "Auto-Lab" inductive salinometer (Guildline Instruments, 1974) which is considered accurate to ±0.004°/$_{oo}$. The reversing thermometers are considered accurate to ±0.02°C. A mean difference was

calculated from the in situ calibrations and used in the data processing. The values used as the calibrations for the processed data are +0.025°C for temperature +0.009°/$_{oo}$ for salinity and 3 decibars for pressure.

No correction was made for the difference in time between the temperature and conductivity sensors. This difference does not show up unless there are large thermal gradients which produce spikes in the salinity. These spikes were manually edited out of the data.

## GRAPHICAL PRESENTATIONS

This report contains section plots of temperature, salinity and sigma-t from cruises 80-019 and 80-034. The sections for cruise 80-019 are presented first followed by the sections for cruise 80-034. Within each cruise, the sections are ordered by increasing station numbers. The geographical location for stations from each cruise is shown in figures 1, 2 and figures 3 to 16 (one figure for each section). Table 1 shows a comparison of the positions of the stations for each cruise.

The horizontal spacing between stations in each section is found by performing a least squares straight line fit to all the station positions and then projecting each station onto this line. The vertical scale for all sections is 200 m depth. The bottom profiles for each section are generated from the soundings taken at each station. The horizontal scale is adjusted for each section to maintain a constant vertical scale.

**ACKNOWLEDGEMENTS**

I would like to thank the many people who assisted in the collection and processing of the data. Special thanks to Mr. John Pritchard who did some of the drafting and for his advice with the layout of the diagrams. I would also like to thank Dr. Brian Petrie for his advice and for reading the manuscript.

**REFERENCES**

Anderson, C. 1983. Ph.D thesis, McGill University, in preparation.

Guildline Instruments. 1974. Preliminary Manual for Model 8400 Autosal Laboratory Salinometer.

Petrie, B. and C. Anderson. 1983. Circulation on the Newfoundland Continental Shelf. Atmosphere-Ocean, 21 (2): 207-226.

Perkin, Ronald G. and Edward Lyn Lewis. 1980. The Practical Salinity Scale 1978: Fitting the Data. IEEE Journal of Oceanic Engineering, Volume OE-5, No. 1 January 1980.

Ross, C.K. 1983. In preparation.

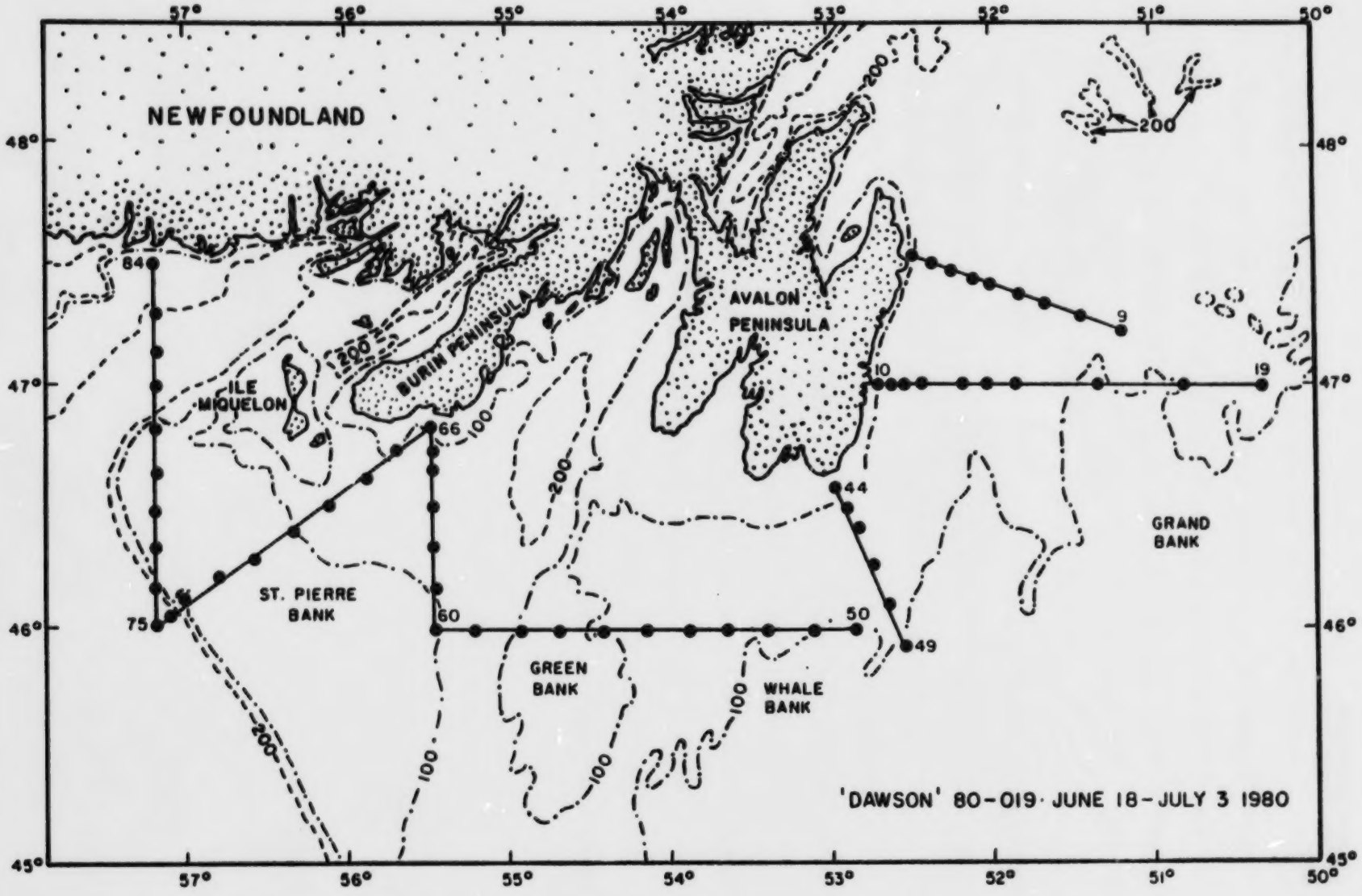



Figure 1 Station positions for Cruise 80-019

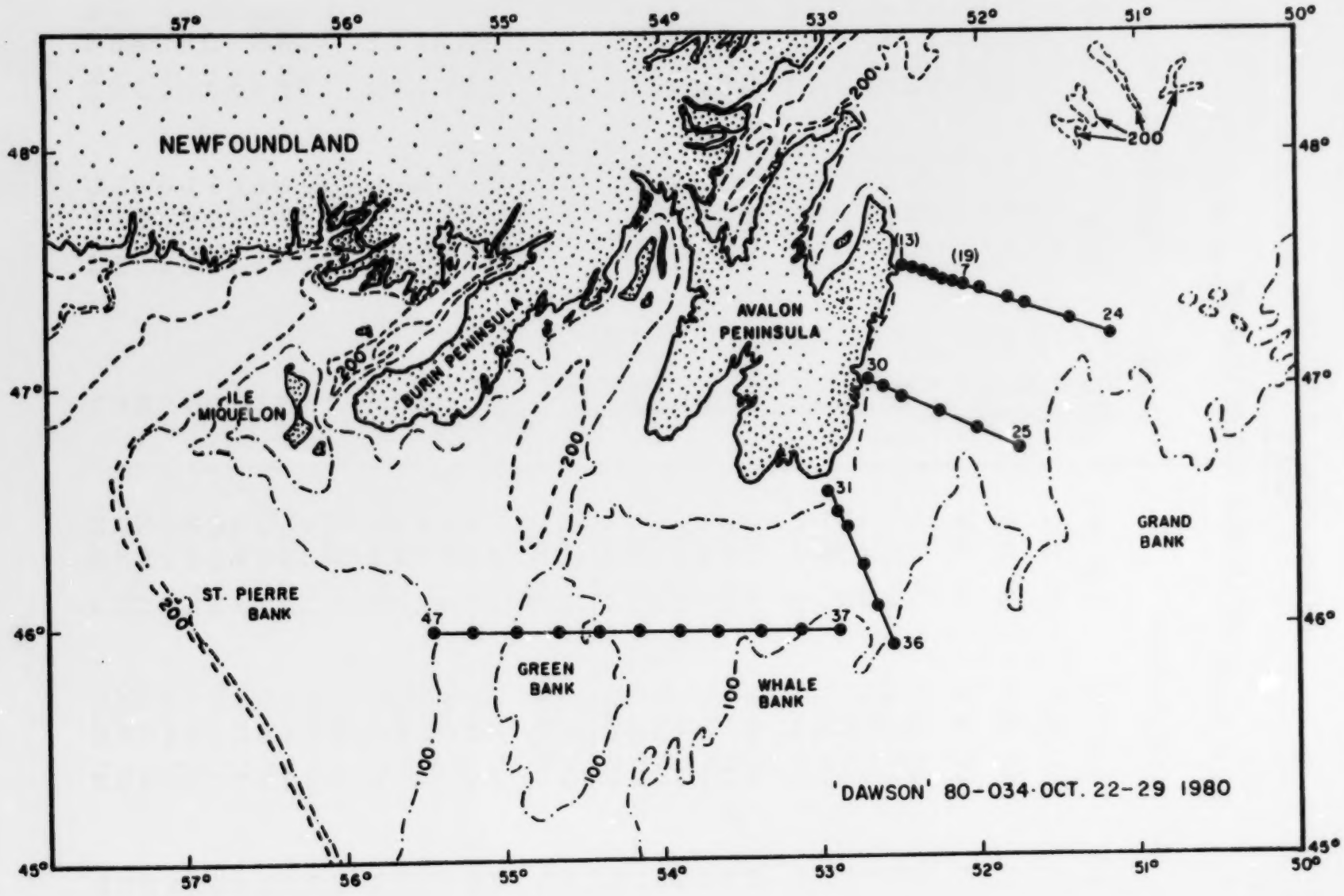



Figure 2 Station positions for cruise 80-034

TABLE 1

COMPARISON OF STATION LOCATIONS

| CRUISE 80-019 | | | CRUISE 80-034 | | |
|---|---|---|---|---|---|
| STN | Latitude | Longitude | STN | Latitude | Longitude |
| 1 | 47° 31.0' | 52° 35.0' | 1,13 | 47° 31.0' | 52° 35.0' |
| | | | 2,12,14 | 47° 30.5' | 52° 31.5' |
| 2 | 47° 30.0' | 52° 28.0' | 3,11,15 | 47° 30.0' | 52° 28.0' |
| | | | 4,10,16 | 47° 29.0' | 52° 24.0' |
| 3 | 47° 28.0' | 52° 20.5' | 5, 9,17 | 47° 28.0' | 52° 20.0' |
| | | | 6, 8,18 | 47° 27.5' | 52° 16.5' |
| 4 | 47° 26.7' | 52° 13.4' | 7, 19 | 47° 27.0' | 52° 13.0' |
| 5 | 47° 25.0' | 52° 06.5' | 20 | 47° 25.0' | 52° 06.0' |
| 6 | 47° 22.8' | 51° 56.3' | 21 | 47° 23.0' | 51° 56.0' |
| 7 | 47° 20.8' | 51° 48.1' | 22 | 47° 21.01' | 51° 48.0' |
| 8 | 47° 18.0' | 51° 34.0' | 23 | 47° 18.0' | 51° 34.0' |
| 9 | 47° 14.0' | 51° 20.0' | 24 | 47° 14.0' | 51° 20.0' |
| 10 | 47° 00.0' | 52° 49.6' | 30 | 47° 03.0' | 52° 50.0' |
| 11 | 46° 59.6' | 52° 45.2' | 29 | 47° 01.0' | 52° 43.0' |
| 12 | 47° 00.1' | 52° 40.0' | 28 | 46° 59.0' | 52° 36.0' |
| 13 | 47° 00.0' | 52° 34.8' | 27 | 46° 55.0' | 52° 21.0' |
| 14 | 47° 00.0' | 52° 19.9' | 26 | 46° 50.0' | 52° 08.0' |
| 15 | 47° 00.4' | 52° 10.5' | 25 | 46° 45.0' | 51° 53.0' |
| 16 | 47° 00.0' | 52° 00.0' | | | |
| 17 | 47° 00.0' | 51° 30.1' | | | |
| 18 | 47° 00.0' | 51° 00.0' | | | |
| 19 | 47° 00.0' | 50° 30.0' | | | |
| 44 | 46° 34.0' | 53° 04.5' | 31 | 46° 34.0' | 53° 04.0' |
| 45 | 46° 29.0' | 53° 00.0' | 32 | 46° 29.0' | 53° 00.0' |
| 46 | 46° 25.0' | 52° 56.5' | 33 | 46° 25.0' | 52° 57.0' |
| 47 | 46° 15.0' | 52° 51.0' | 34 | 46° 15.0' | 52° 51.0' |
| 48 | 46° 05.0' | 52° 46.0' | 35 | 46° 05.0' | 52° 46.0' |
| 49 | 45° 55.0' | 52° 40.2' | 36 | 45° 55.0' | 52° 40.0' |
| 60 | 46° 00.0' | 55° 30.02' | 47 | 46° 00.0' | 55° 30.0' |
| 59 | 46° 00.0' | 55° 15.0' | 46 | 46° 00.0' | 55° 15.0' |
| 58 | 46° 00.0' | 55° 00.0' | 45 | 46° 00.0' | 55° 00.0' |
| 57 | 46° 00.0' | 54° 45.0' | 44 | 46° 00.0' | 54° 45.0' |
| 56 | 45° 59.95' | 54° 30.01' | 43 | 46° 00.0' | 54° 30.0' |
| 55 | 45° 59.98' | 54° 14.97' | 42 | 46° 00.0' | 54° 15.0' |
| 54 | 46° 00.05' | 54° 00.0' | 41 | 46° 00.0' | 54° 00.0' |
| 53 | 46° 00.04' | 53° 45.0' | 40 | 46° 00.0' | 53° 45.0' |
| 52 | 45° 59.99' | 53° 30.05' | 39 | 46° 00.0' | 53° 30.0' |
| 51 | 45° 59.94' | 53° 14.97' | 38 | 46° 00.0' | 53° 15.0' |
| 50 | 46° 00.0' | 52° 59.92' | 37 | 46° 00.0' | 53° 00.0' |

TABLE 1

COMPARISON OF STATION LOCATIONS

(Continued)

| CRUISE 80-019 | | | CRUISE 80-034 |
|---|---|---|---|
| STN | Latitude | Longitude | |
| 66 | 46° 50.0' | 55° 30.0' | |
| 65 | 46° 45.0' | 55° 29.88' | |
| 64 | 46° 40.11' | 55° 30.12' | |
| 63 | 46° 30.0' | 55° 30.0' | |
| 62 | 46° 20.01' | 55° 29.93' | |
| 61 | 46° 09.87' | 55° 29.88' | |
| 60 | 46° 00.0' | 55° 30.02' | |
| 66 | 46° 50.0' | 55° 30.0' | |
| 67 | 46° 45.0' | 55° 45.0' | |
| 68 | 46° 37.5' | 55° 57.5' | |
| 69 | 46° 30.07' | 56° 10.04' | |
| 70 | 46° 24.91' | 56° 22.77' | |
| 71 | 46° 17.1' | 56° 35.03' | |
| 72 | 46° 12.5' | 56° 47.5' | |
| 73 | 46° 07.5' | 57° 00.0' | |
| 74 | 46° 02.5' | 57° 05.0' | |
| 75 | 46° 00.0' | 57° 10.0' | |
| 84 | 47° 30.0' | 57° 10.0' | |
| 83 | 47° 20.0' | 57° 10.0' | |
| 82 | 47° 10.0' | 57° 10.0' | |
| 81 | 47° 00.0' | 57° 10.0' | |
| 80 | 46° 50.1' | 57° 09.83' | |
| 79 | 46° 40.0' | 57° 09.8' | |
| 78 | 46° 30.0' | 57° 10.0' | |
| 77 | 46° 20.0' | 57° 10.0' | |
| 76 | 46° 10.0' | 57° 10.0' | |
| 75 | 46° 00.0' | 57° 10.0' | |

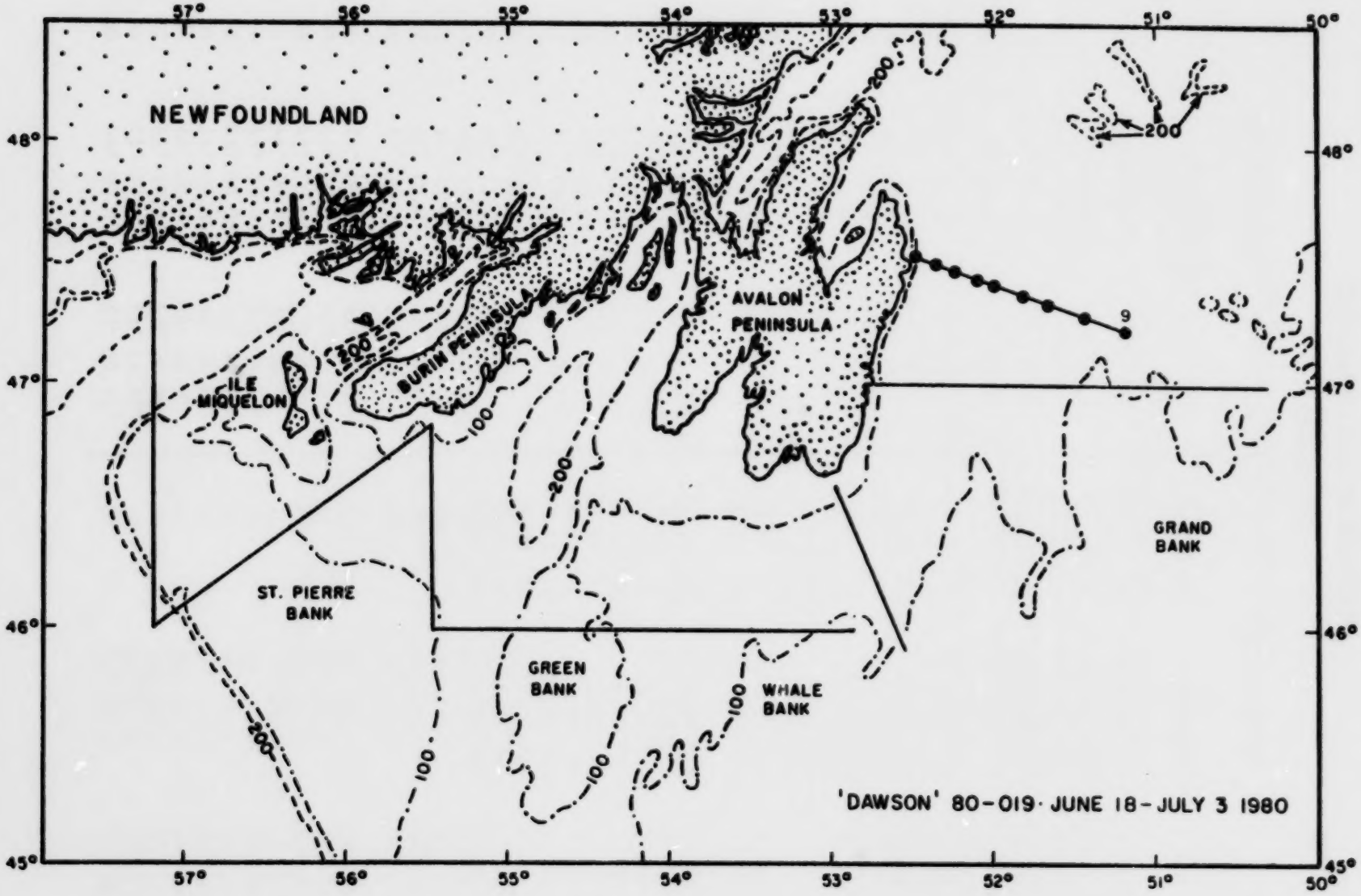
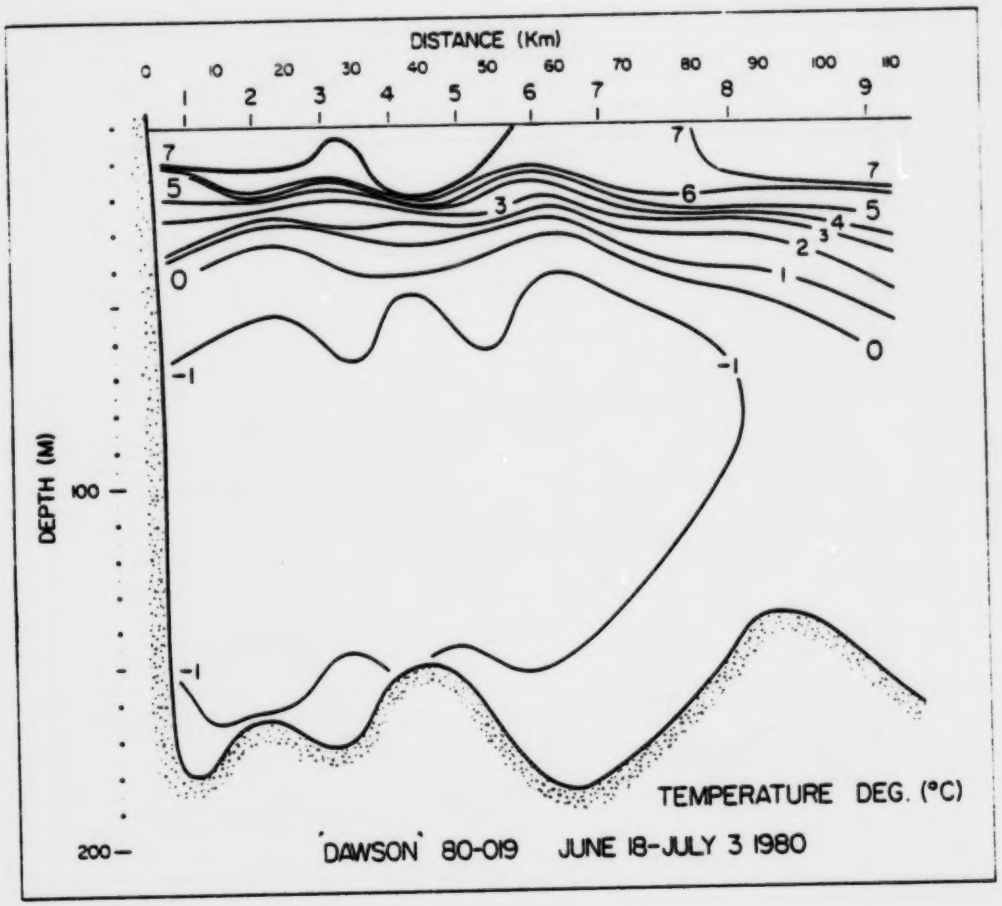



Figure 3 Position of stations 1-9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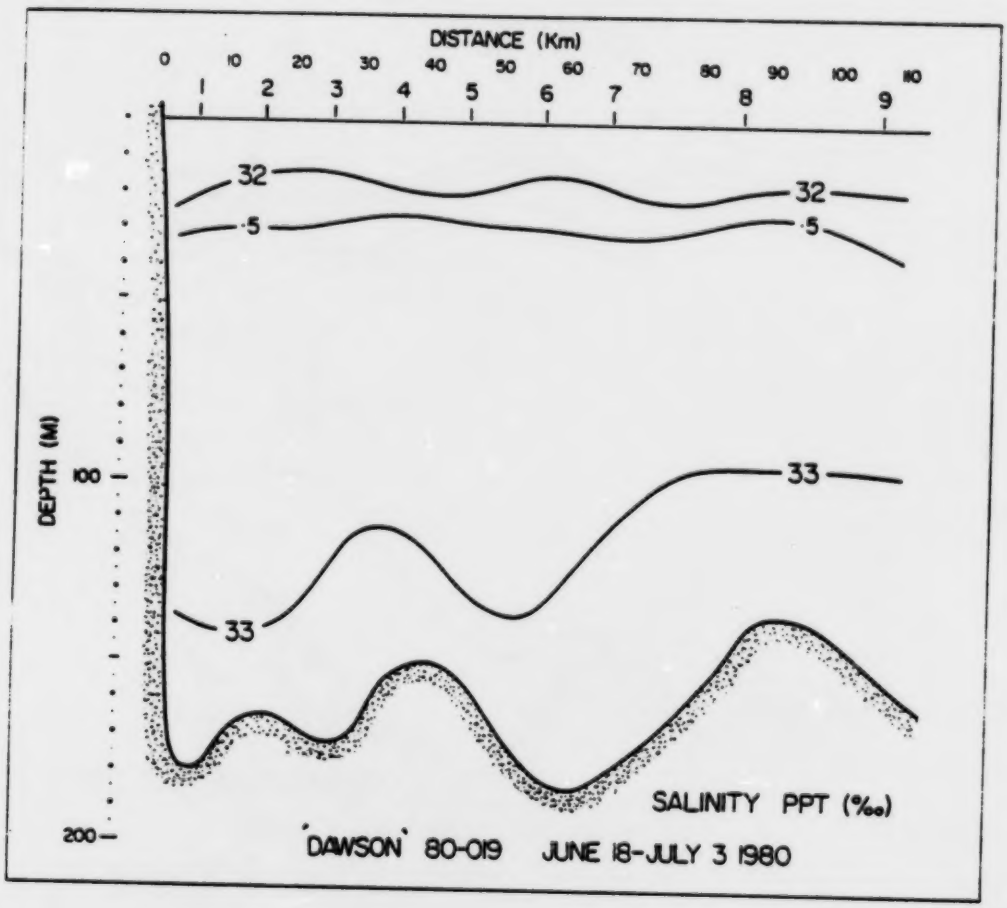
DAWSON 80-019 JUNE 18-JULY 3 1980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32
32
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33
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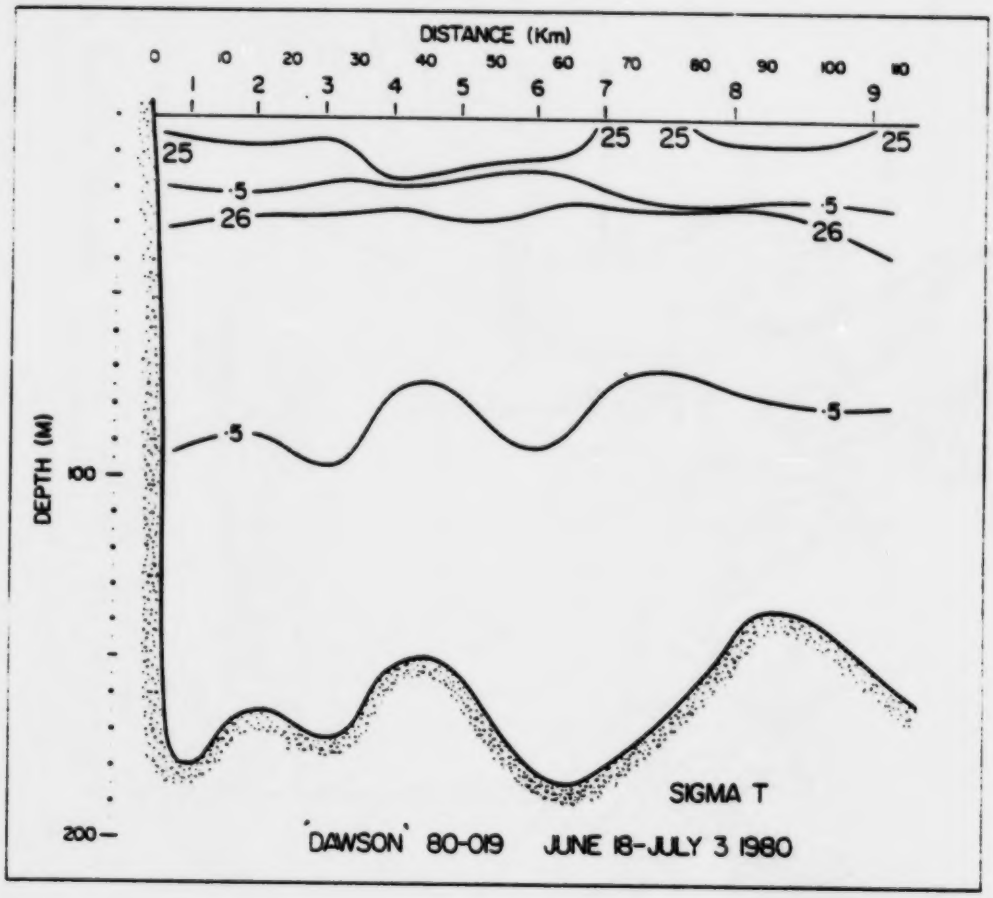
DEPTH (M)
100
200
SALINITY PPT (‰)
'DAWSON' 80-019 JUNE 18-JULY 3 1980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'DAWSON' 80-019 JUNE 18-JULY 3 1980

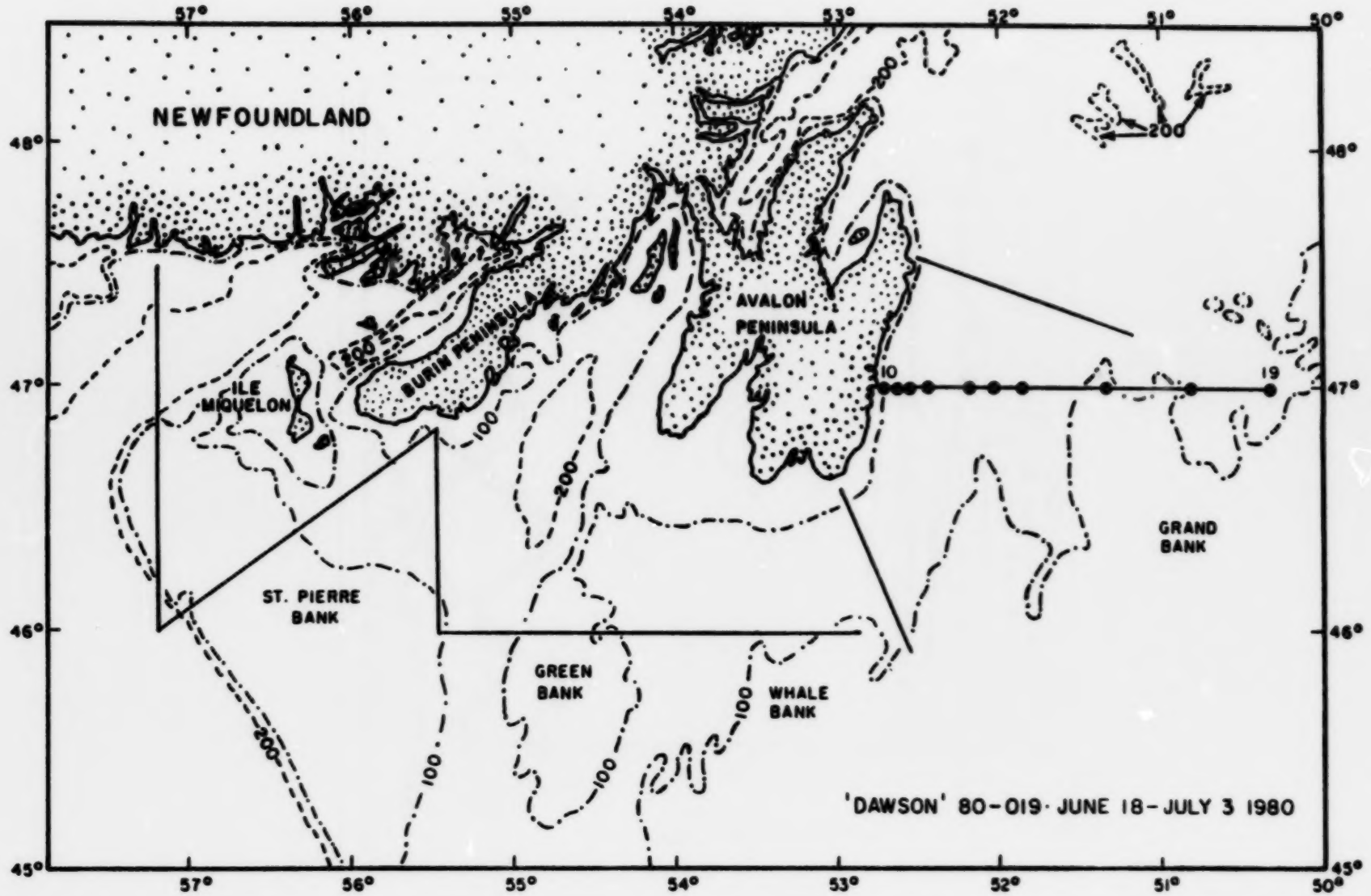
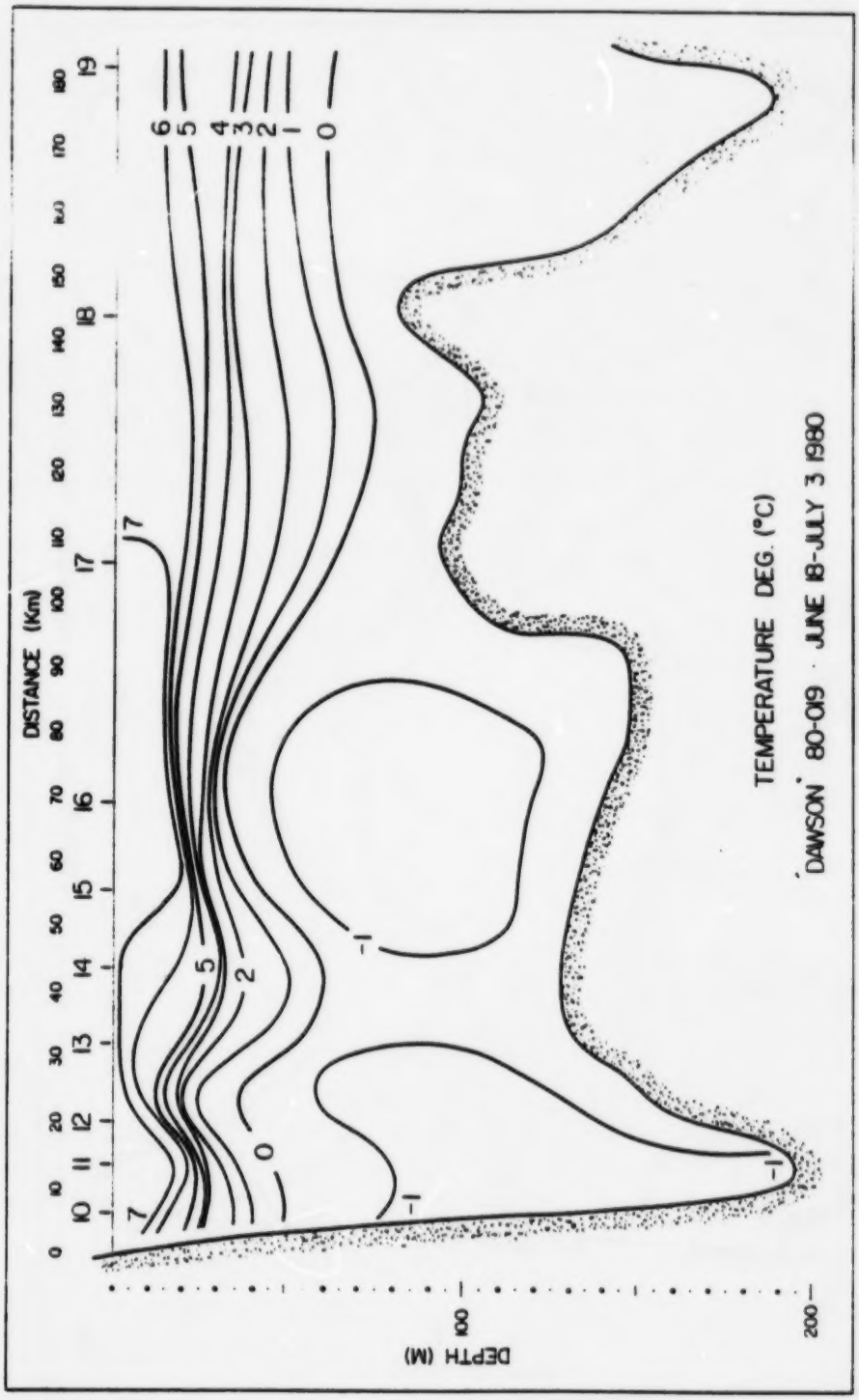



Figure 4 Position of stations 10-19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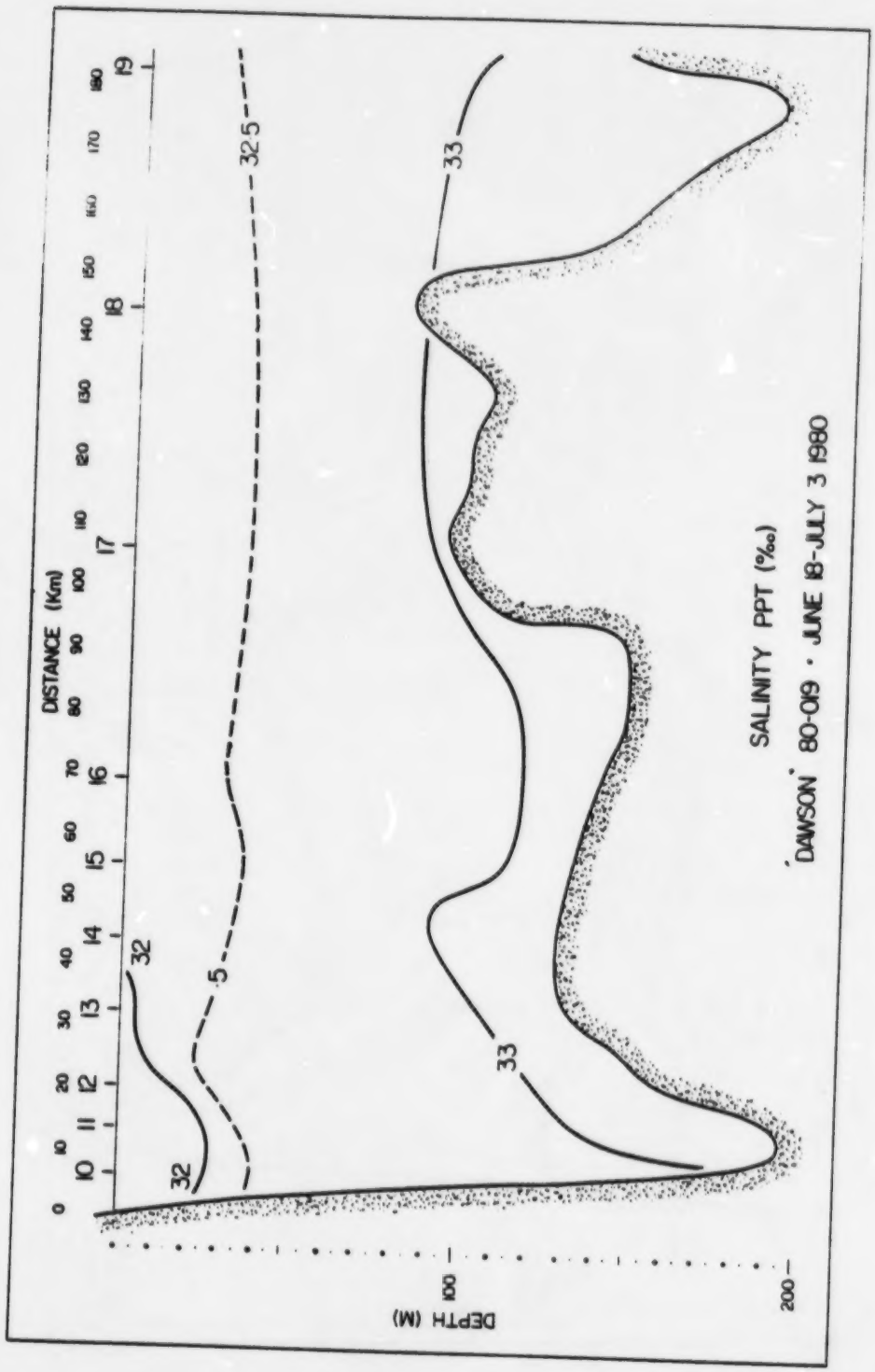
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120
130
140
150
160
170
180
19
32
32
5
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33
33
DEPTH (M)
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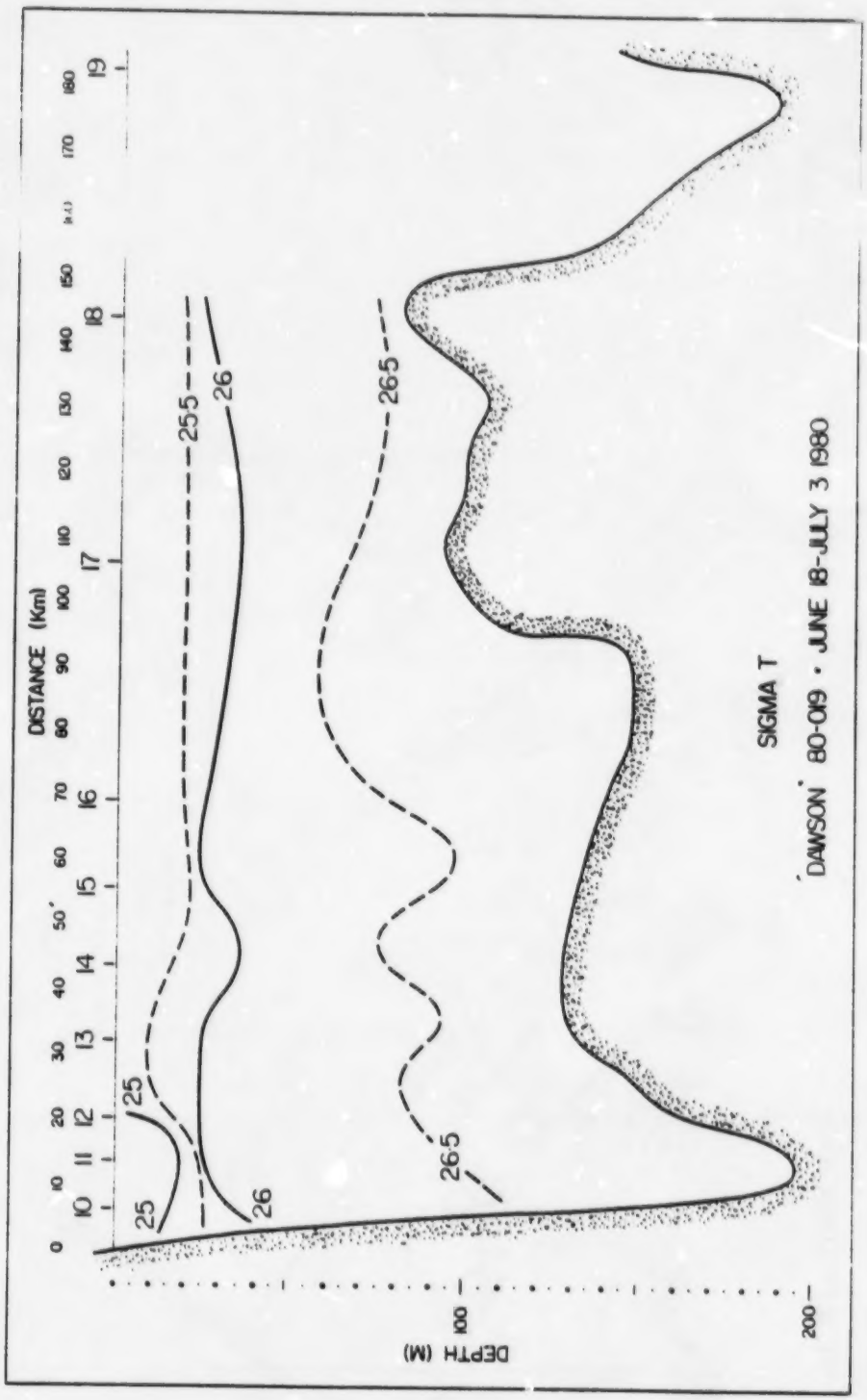
200
SALINITY PPT (‰)
'DAWSON' 80-019 · JUNE 18-JULY 3 1980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DAWSON 80-019 • JUNE 18-JULY 3 1980

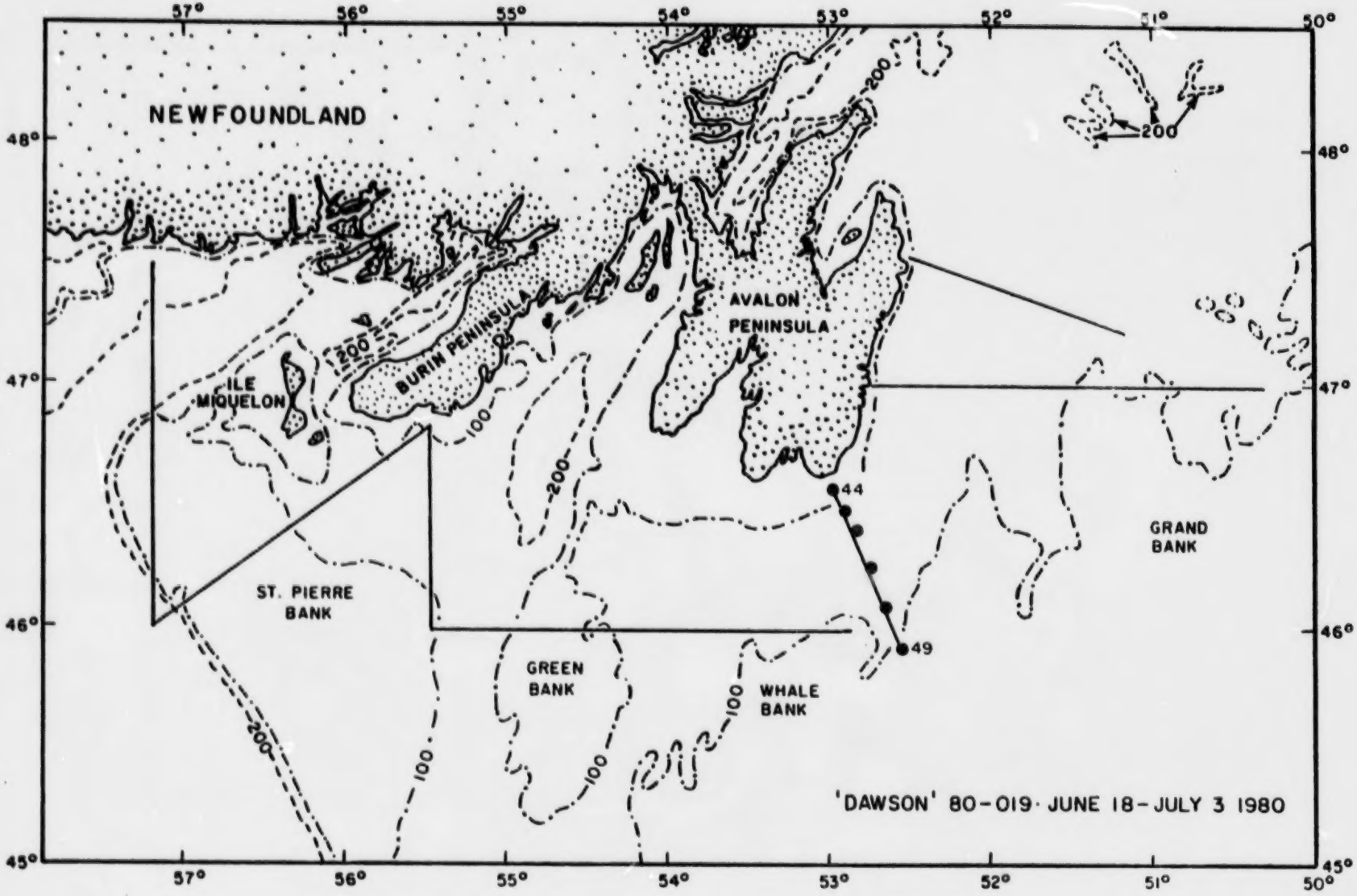
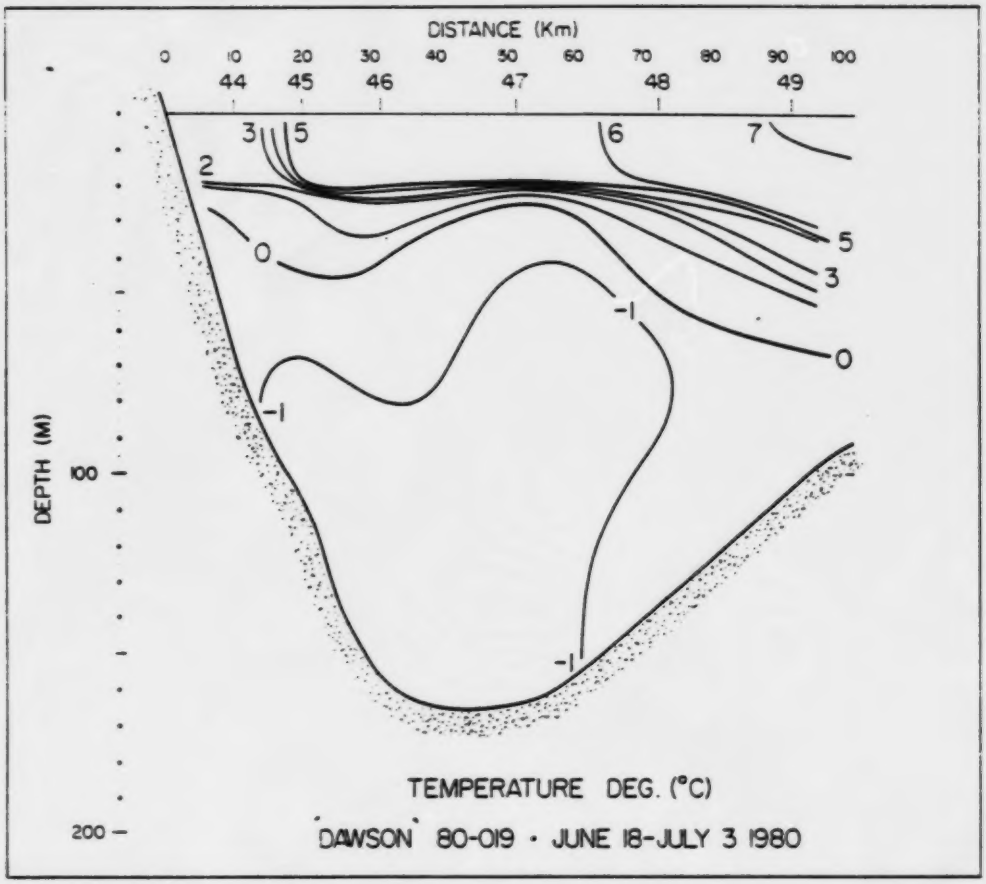



Figure 5 Position of stations 44-49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6
7
2
0
5
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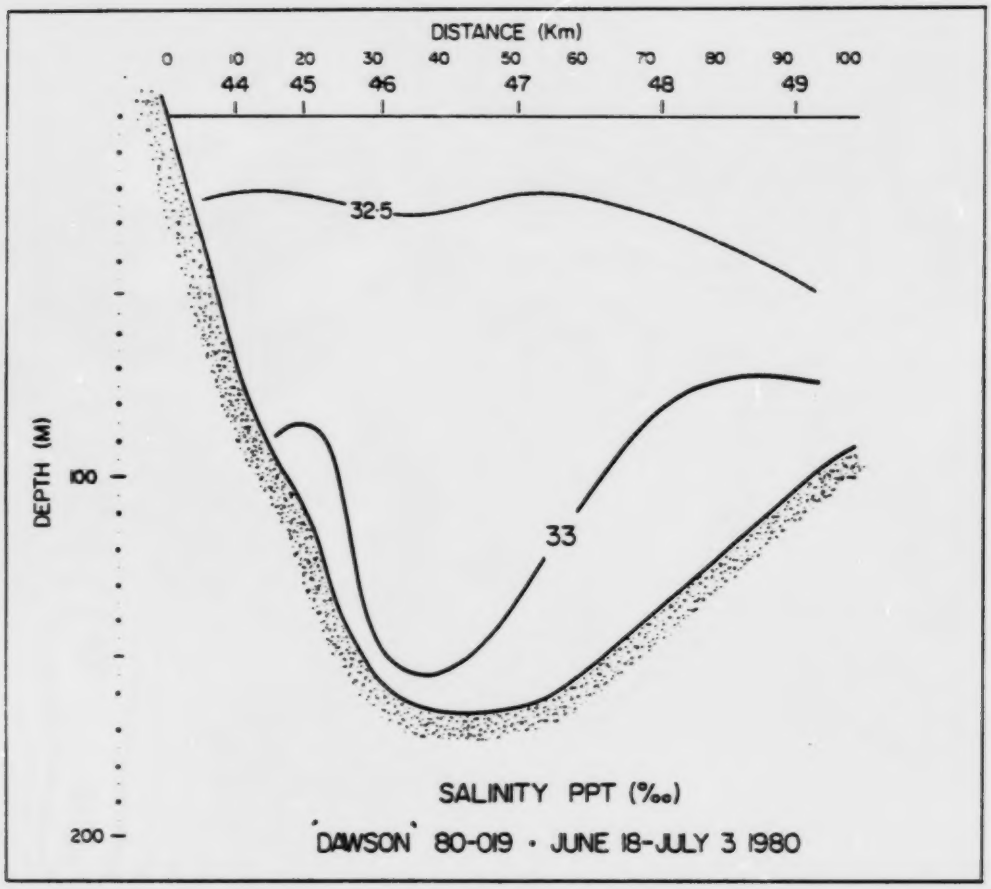
TEMPERATURE DEG. (°C)
DAWSON 80-019 • JUNE 18-JULY 3 1980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80
90
100
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45
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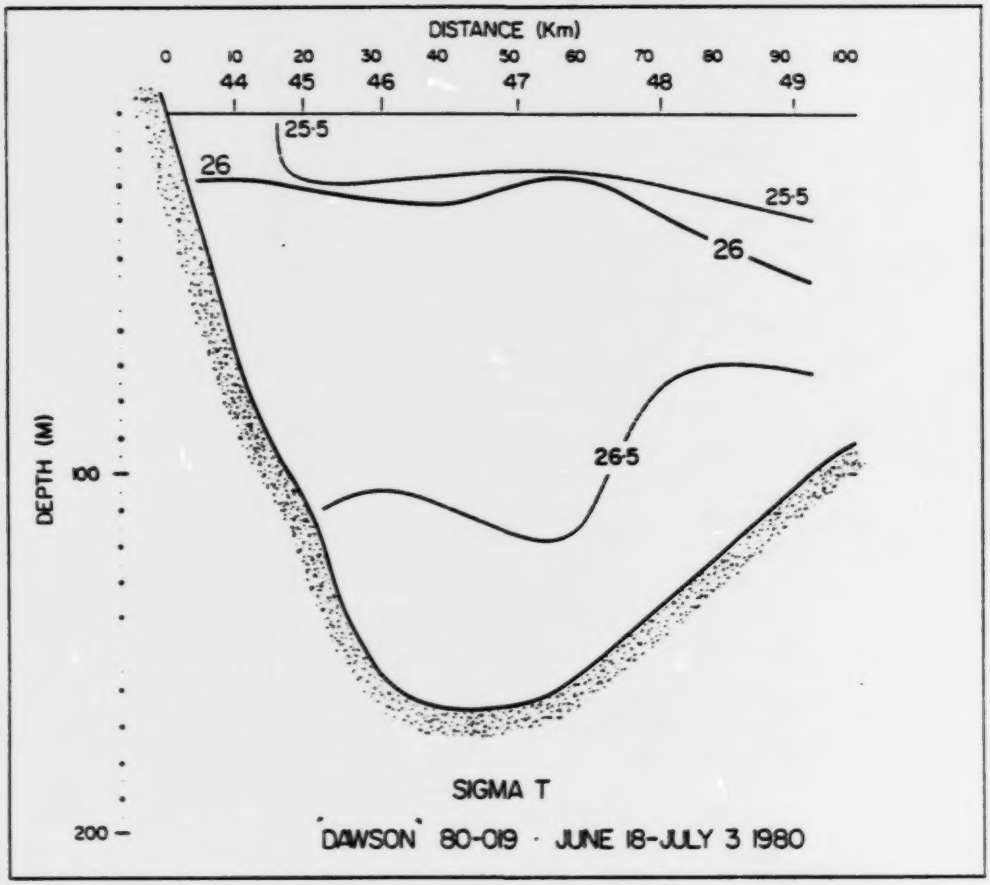
33
DEPTH (M)
100
200
SALINITY PPT (‰)
DAWSON 80-019 • JUNE 18-JULY 3 1980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60
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80
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45
46
47
48
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25·5
26
25·5
26
26·5
DEPTH (M)
100
200
SIGMA T
DAWSON 80-019 · JUNE 18-JULY 3 1980

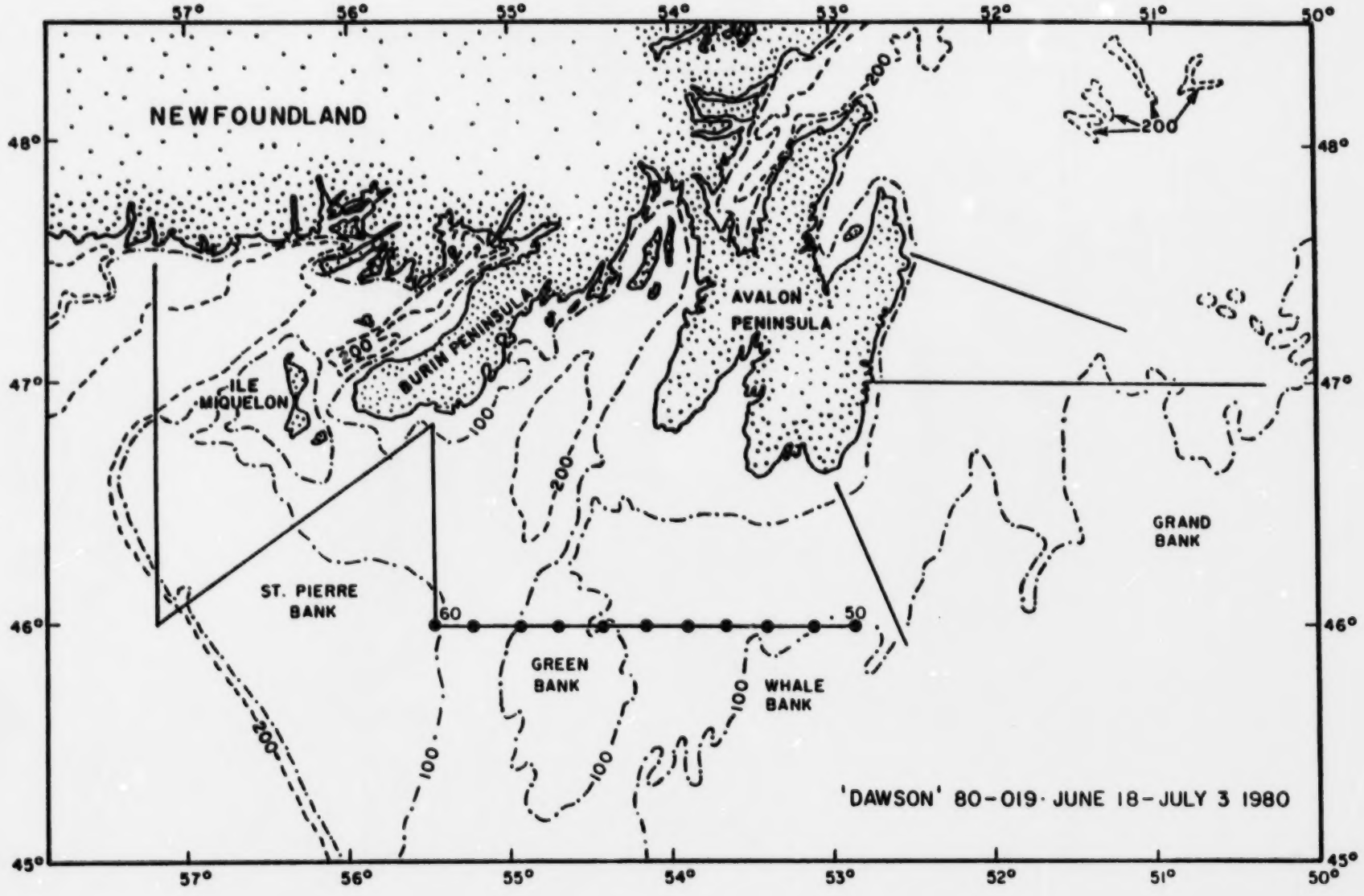
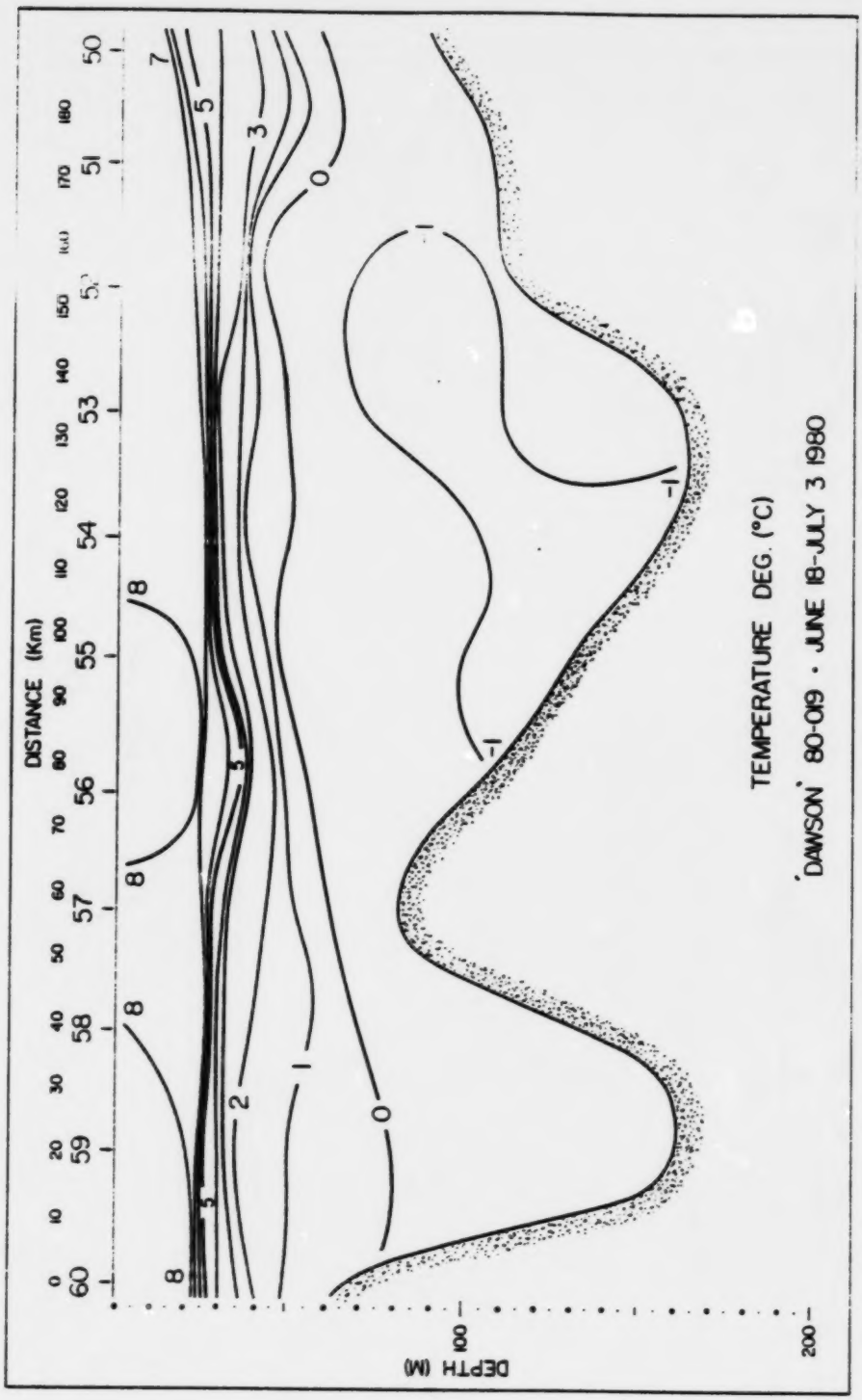
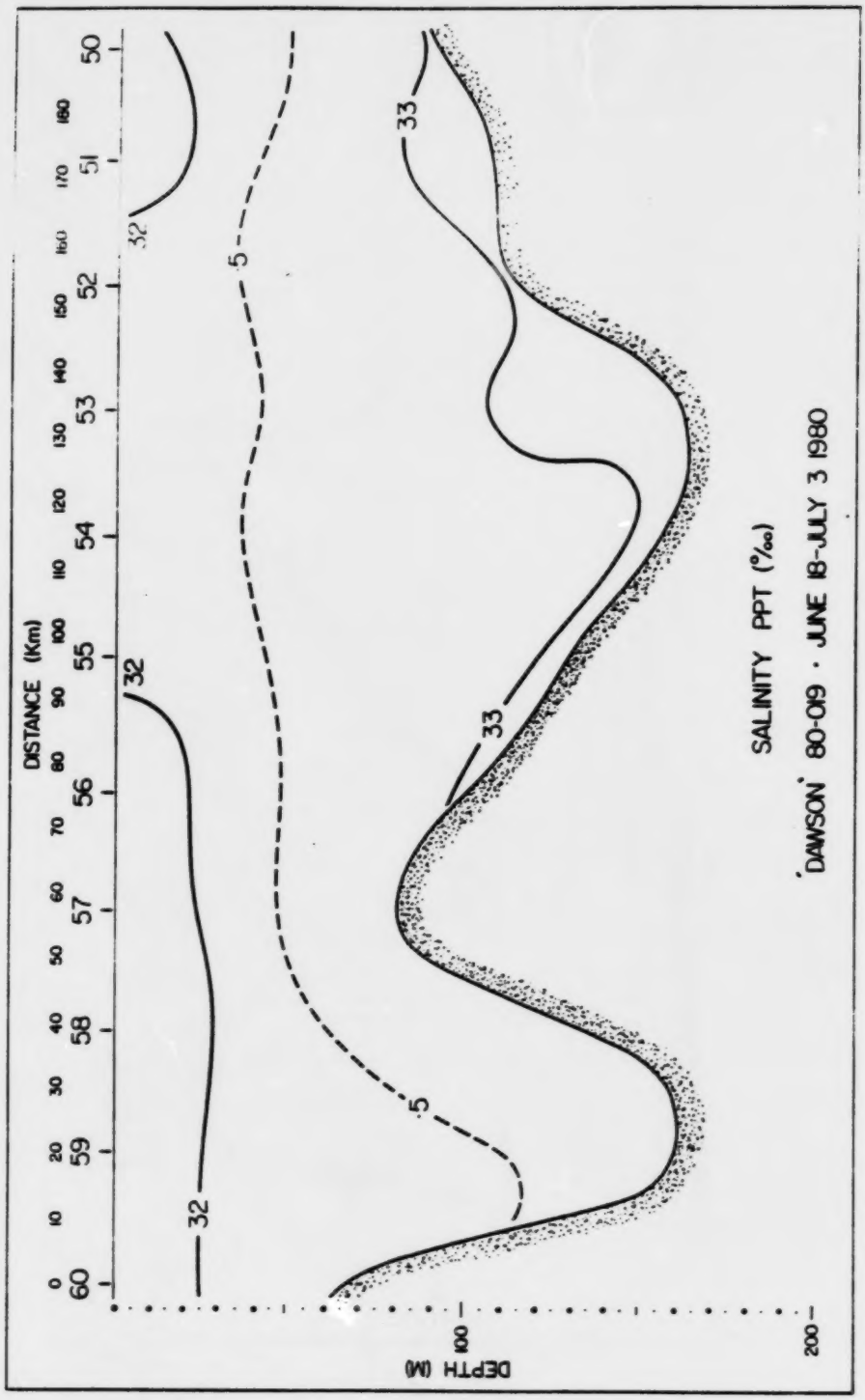
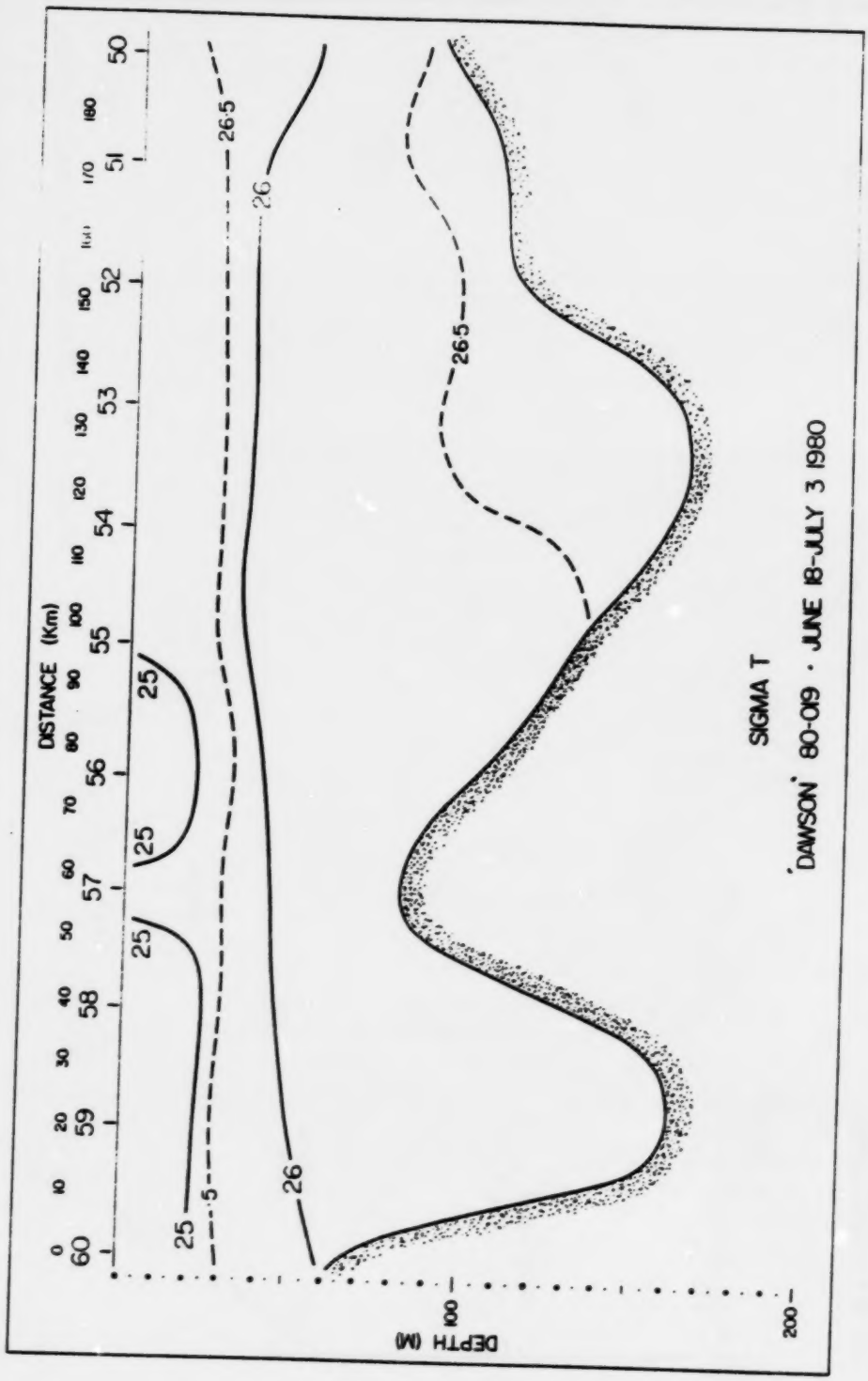



Figure 6 Position of stations 50-60


DISTANCE (Km)
DEPTH (M)
TEMPERATURE DEG. (°C)
'DAWSON' 80-019 · JUNE 18-JULY 3 1980


DISTANCE (Km)
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
60 59 58 57 56 55 54 53 52 51 50
32
32
5
5
33
33
DEPTH (M)
100
200
SALINITY PPT (‰)
'DAWSON' 80-019 · JUNE 18-JULY 3 1980


DISTANCE (Km)
DEPTH (M)
SIGMA T
'DAWSON' 80-019 · JUNE 18-JULY 3 1980
25
26
26.5

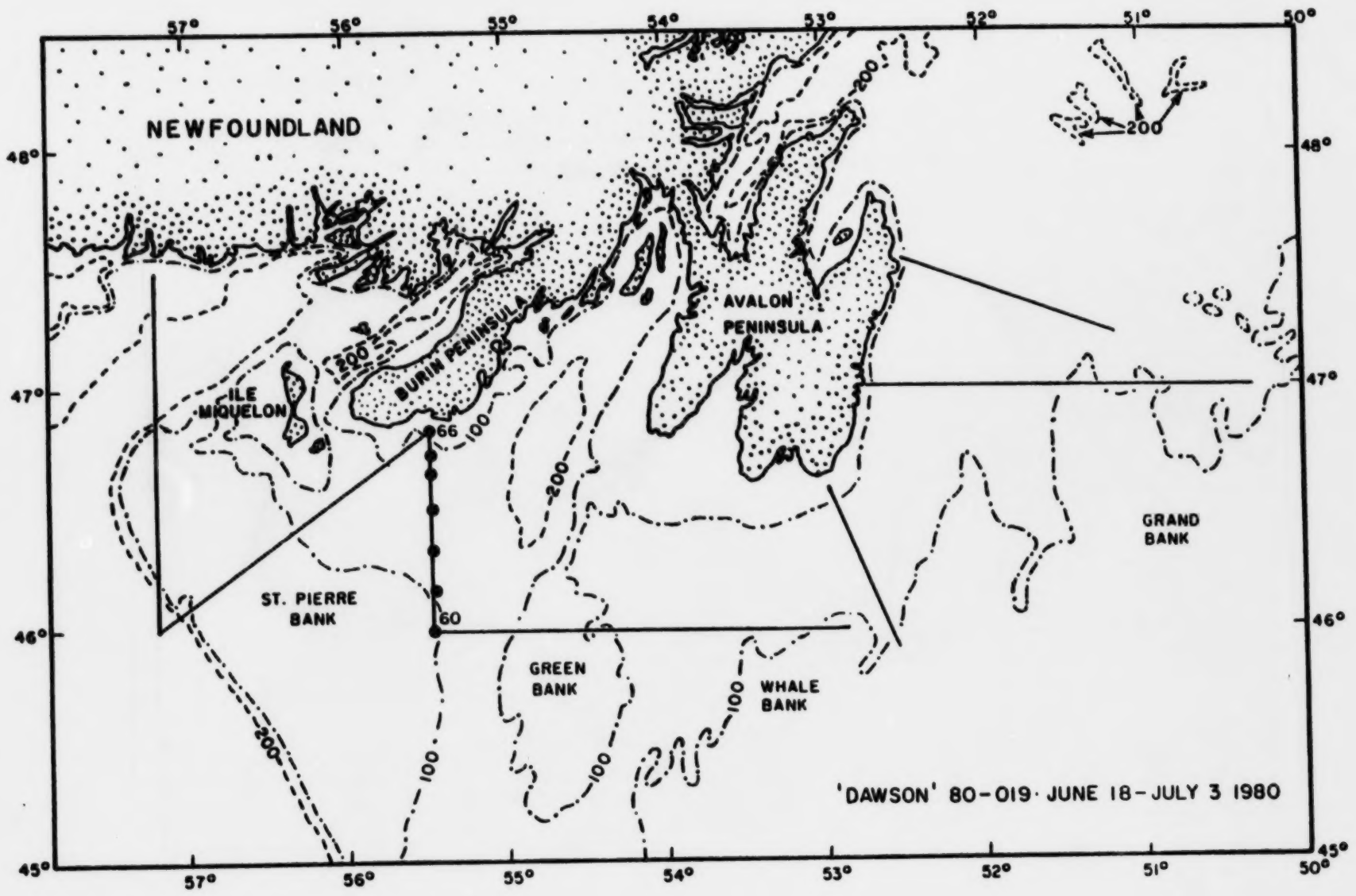
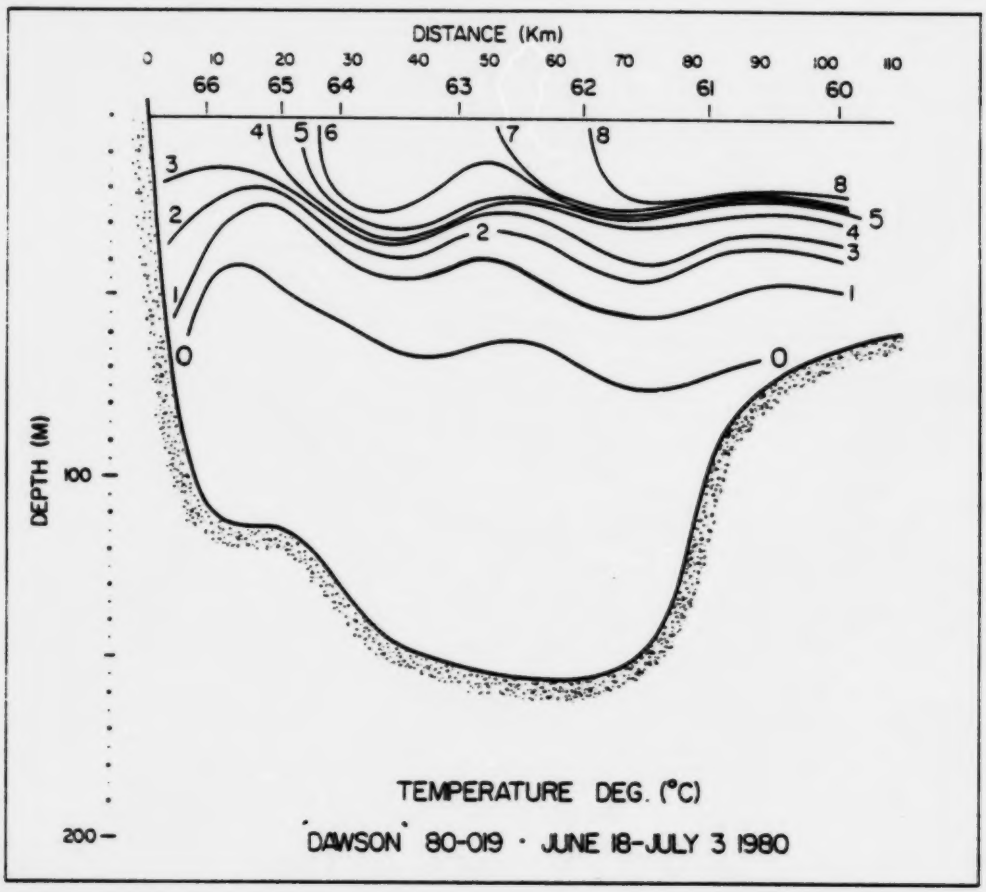
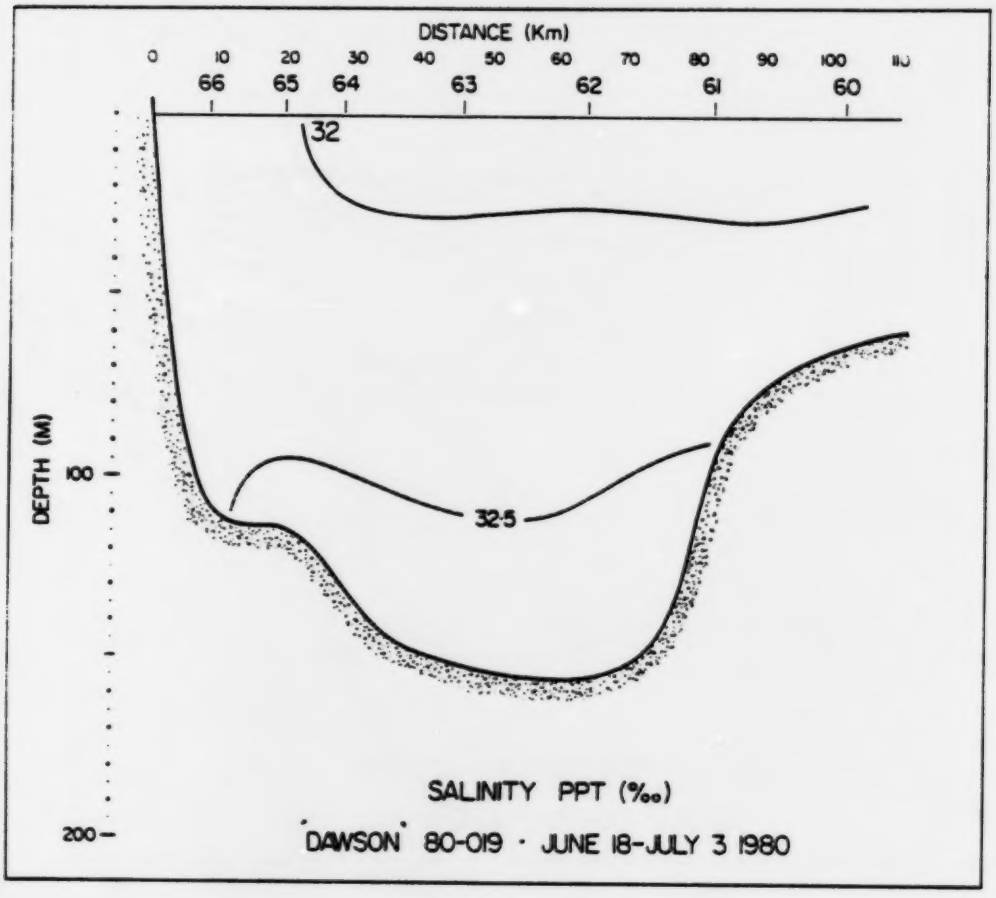
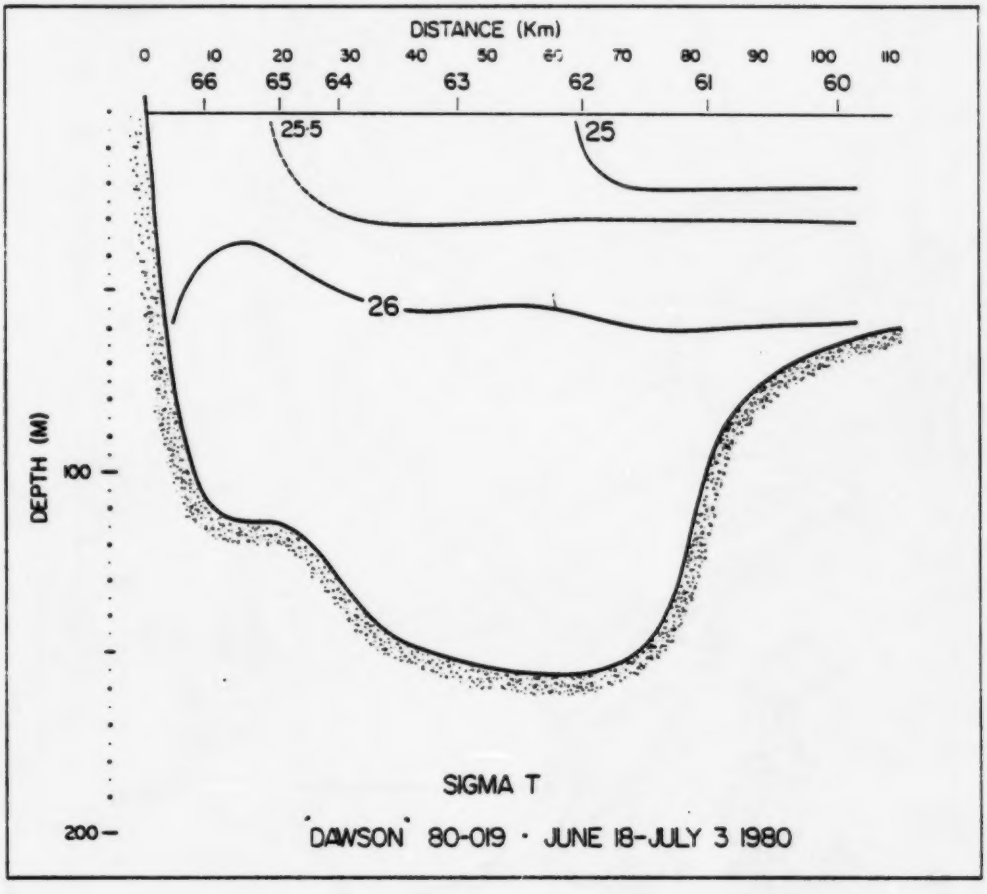



Figure 7 Position of stations 60-66


DISTANCE (Km)
0 10 20 30 40 50 60 70 80 90 100 110
66 65 64 63 62 61 60
DEPTH (M)
100
200
TEMPERATURE DEG. (°C)
DAWSON 80-019 · JUNE 18-JULY 3 1980


DISTANCE (Km)
0
10
20
30
40
50
60
70
80
90
100
66
65
64
63
62
61
60
32
32·5
DEPTH (M)
100
200
SALINITY PPT (‰)
DAWSON 80-019 · JUNE 18-JULY 3 1980


DISTANCE (Km)
0 10 20 30 40 50 60 70 80 90 100 110
66 65 64 63 62 61 60
25.5
25
26
DEPTH (M)
100
200
SIGMA T
DAWSON 80-019 · JUNE 18-JULY 3 1980

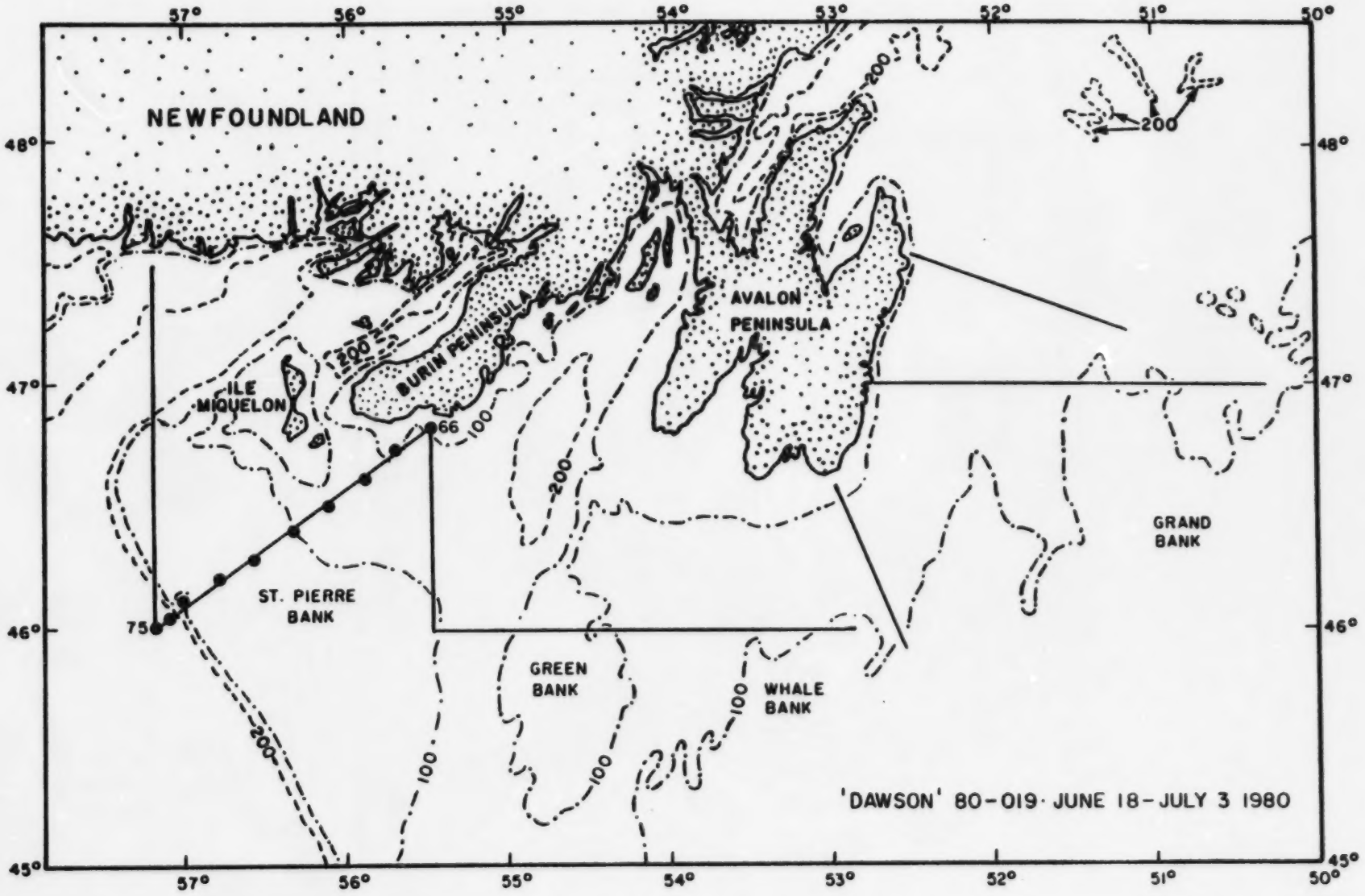
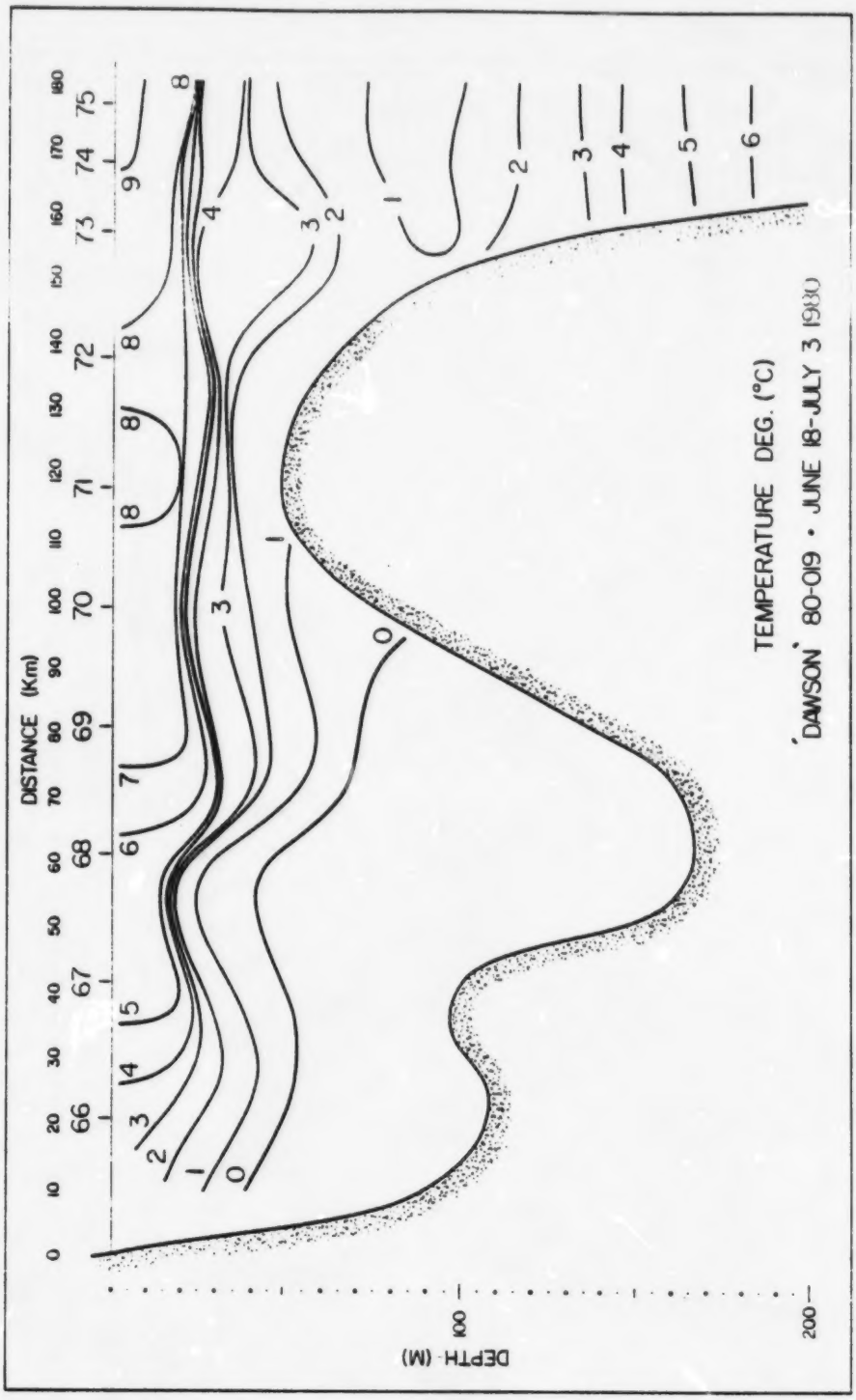
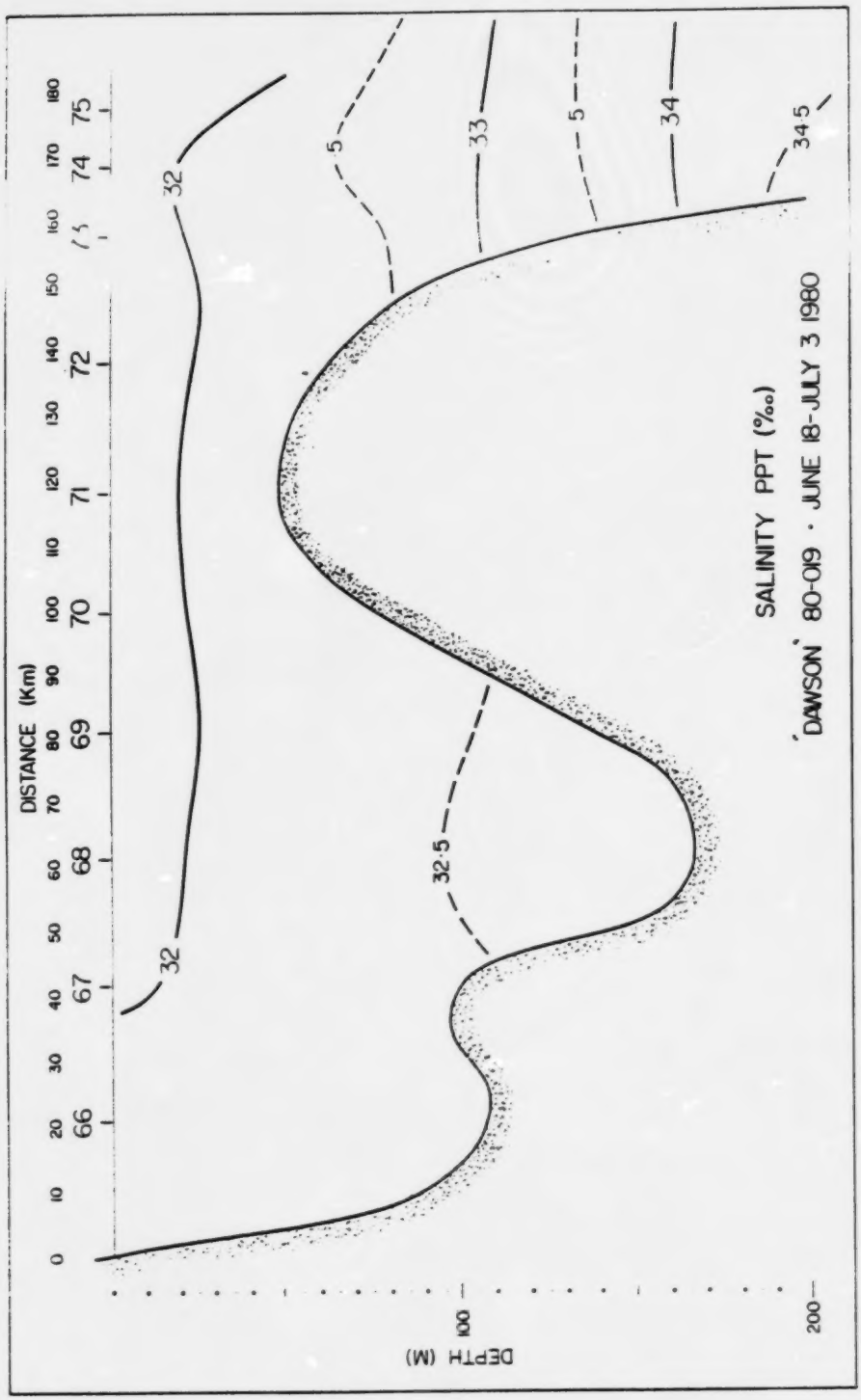
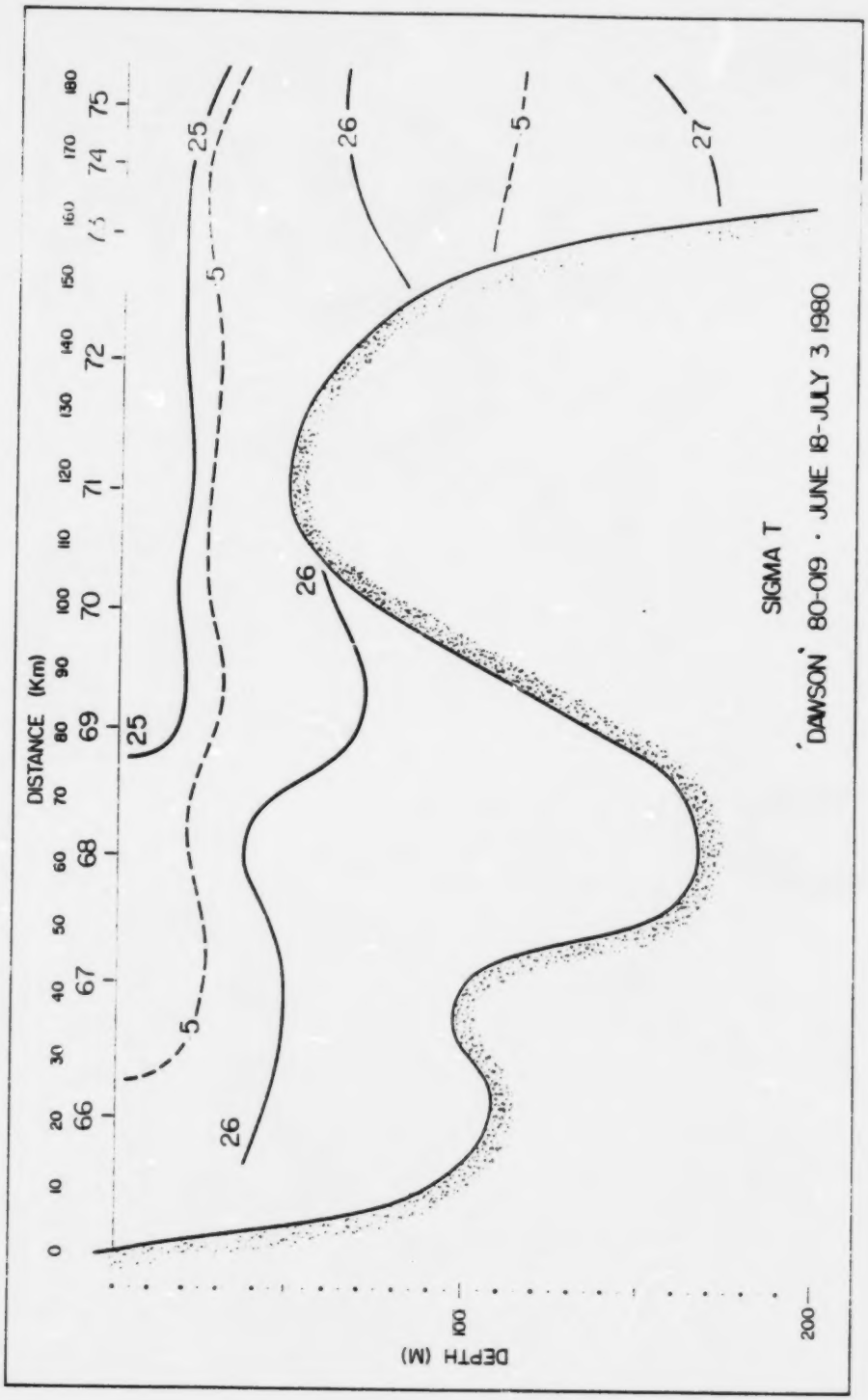



Figure 8 Position of stations 66-75


DISTANCE (Km)
DEPTH (M)
TEMPERATURE DEG. (°C)
'DAWSON' 80-019 • JUNE 18-JULY 3 1980


DISTANCE (Km)
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
66 67 68 69 70 71 72 74 75
DEPTH (M)
100
200
32
32
32·5
5
33
5
34
34·5
SALINITY PPT (‰)
'DAWSON' 80-019 · JUNE 18-JULY 3 1980


DISTANCE (Km)
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
66 67 68 69 70 71 72 73 74 75
25
26
5
27
SIGMA T
'DAWSON' 80-019 · JUNE 18-JULY 3 1980
DEPTH (M)
100
200

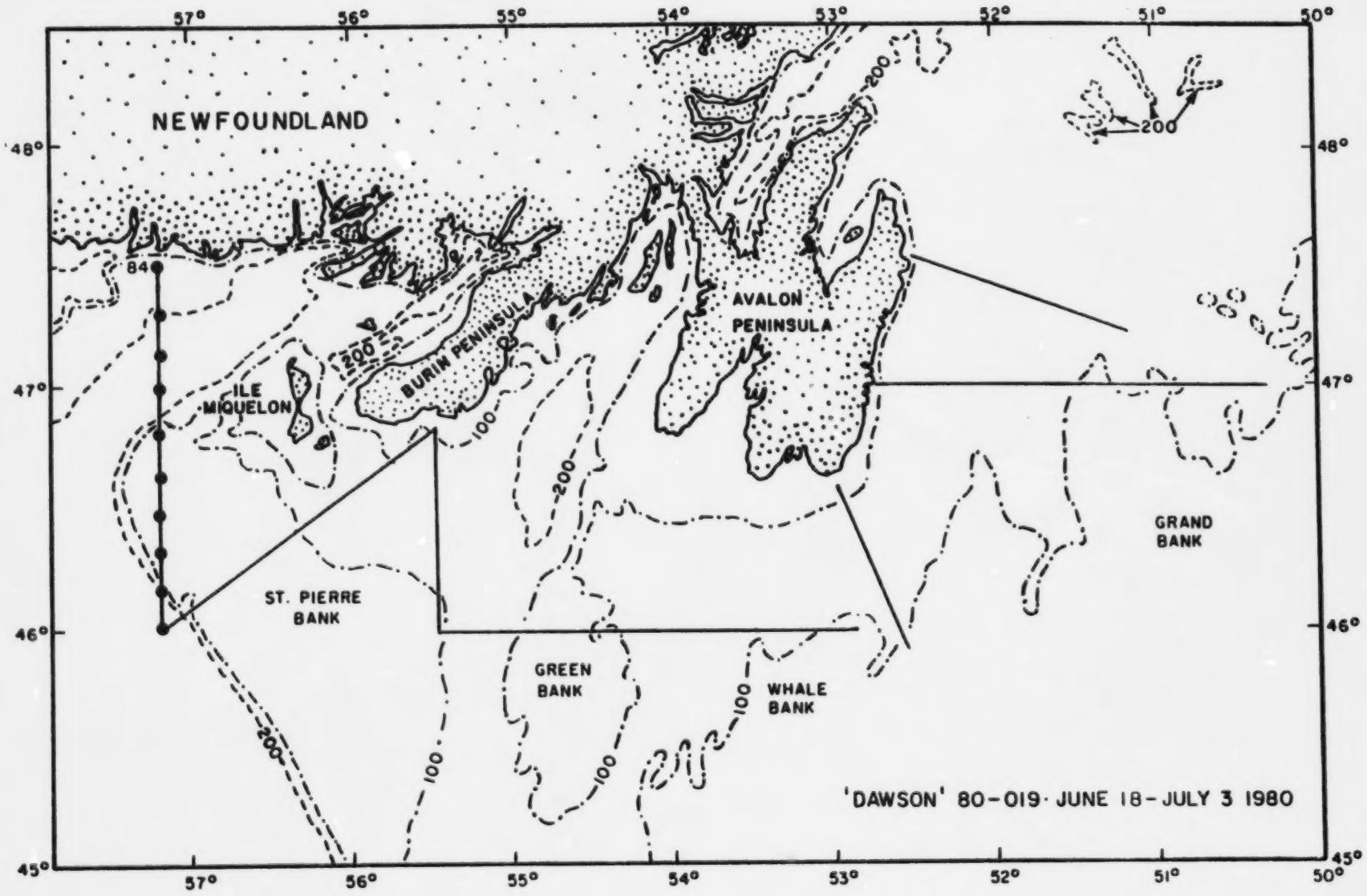
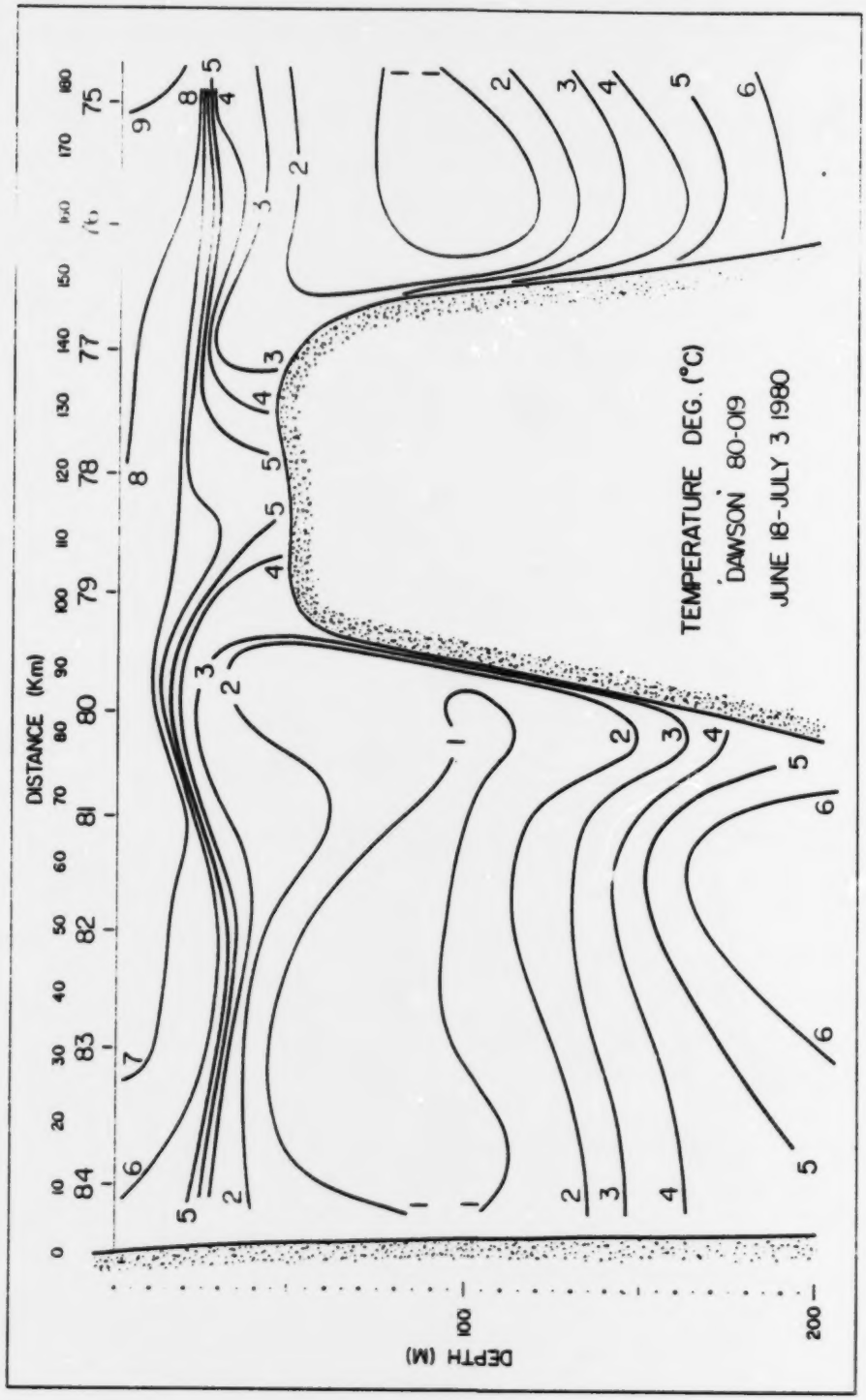
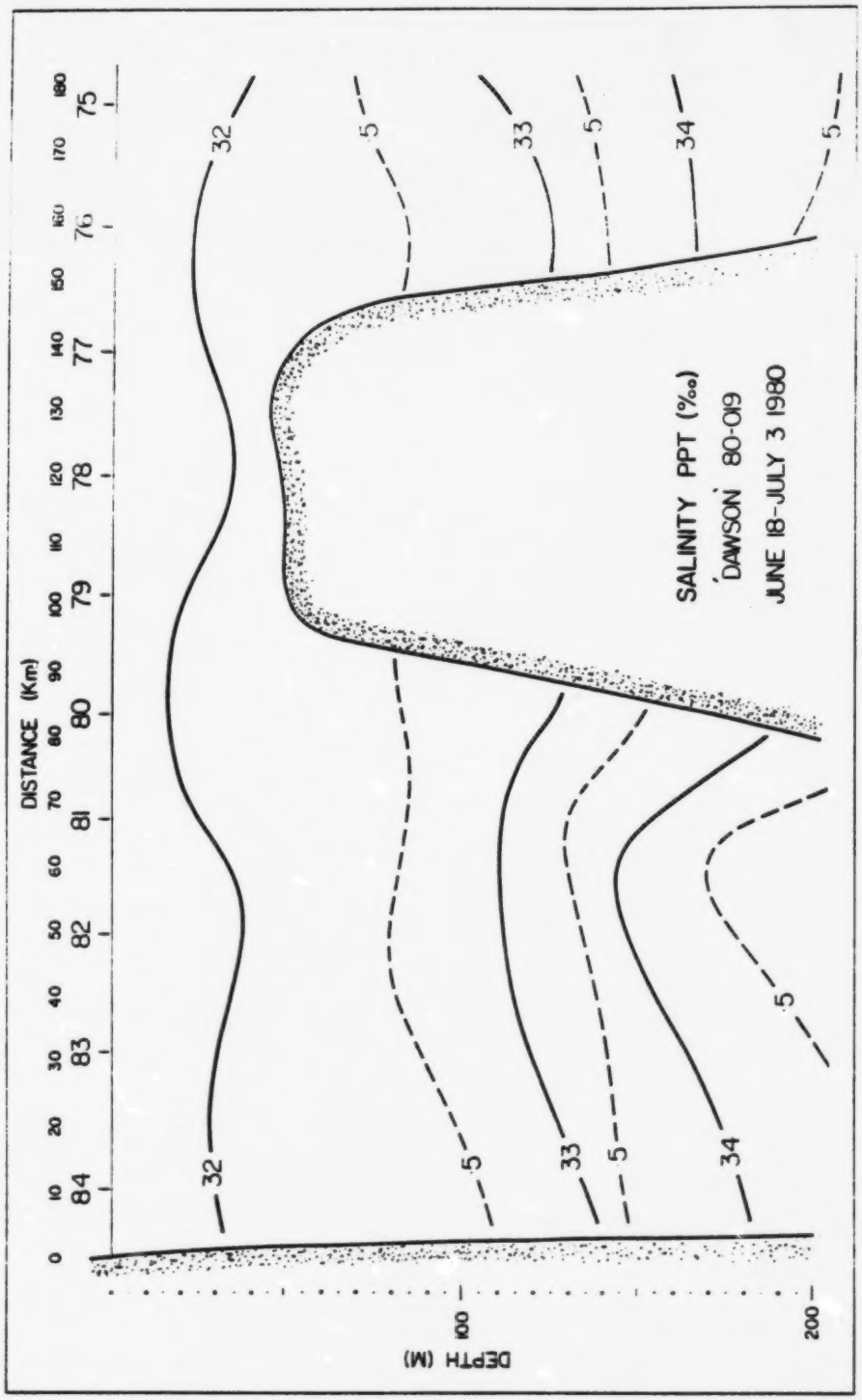
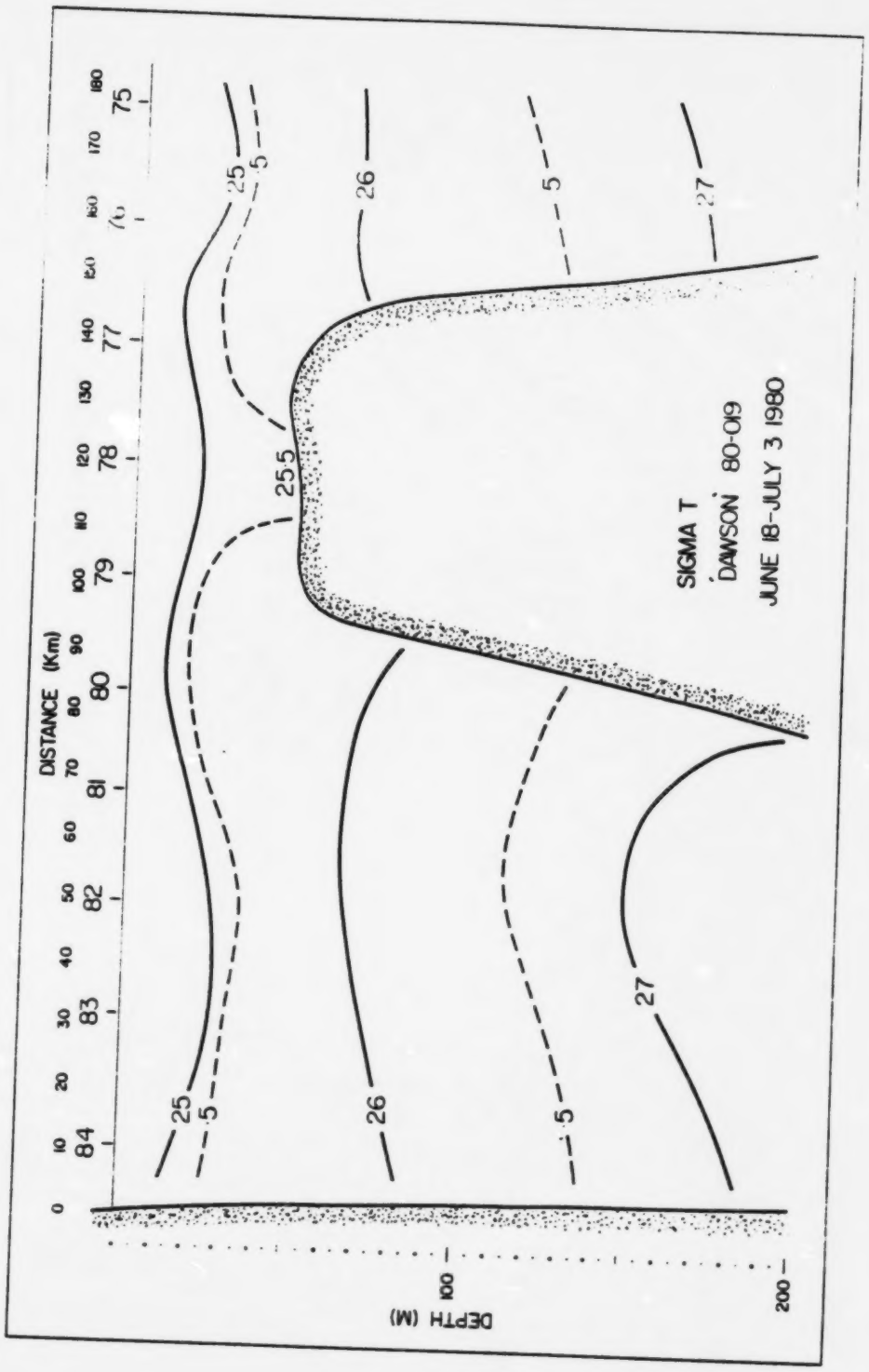



Figure 9 Position of stations 75-84


TEMPERATURE DEG. (°C)
DAWSON 80-019
JUNE 18-JULY 3 1980
DISTANCE (Km)
DEPTH (M)


SALINITY PPT (‰)
DAWSON 80-019
JUNE 18-JULY 3 1980
DISTANCE (Km)
DEPTH (M)
32
5
33
5
34
5


DISTANCE (Km)
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
84 83 82 81 80 79 78 77 75
DEPTH (M)
100
200
25
25.5
26
27
SIGMA T
DAWSON 80-019
JUNE 18-JULY 3 1980

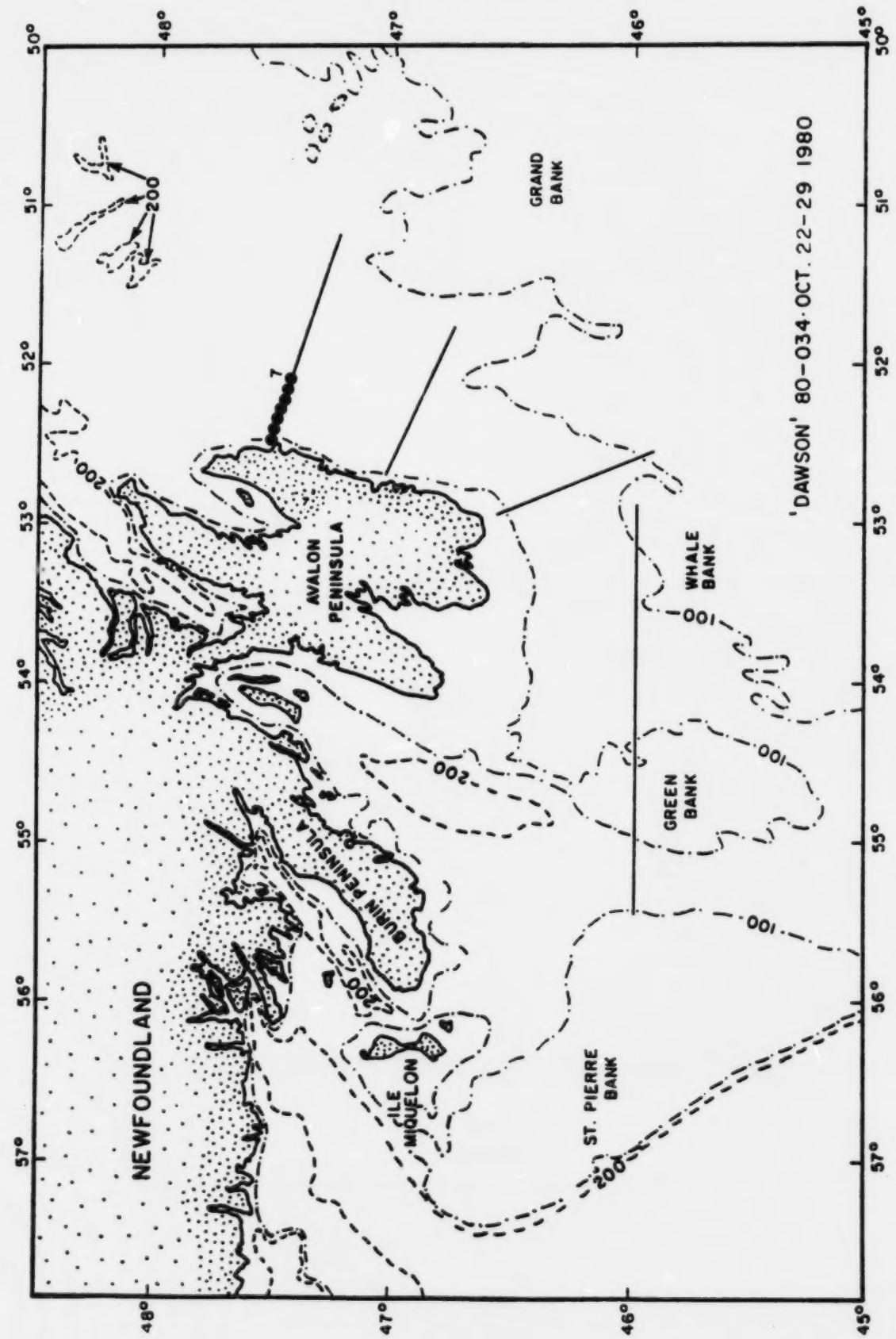
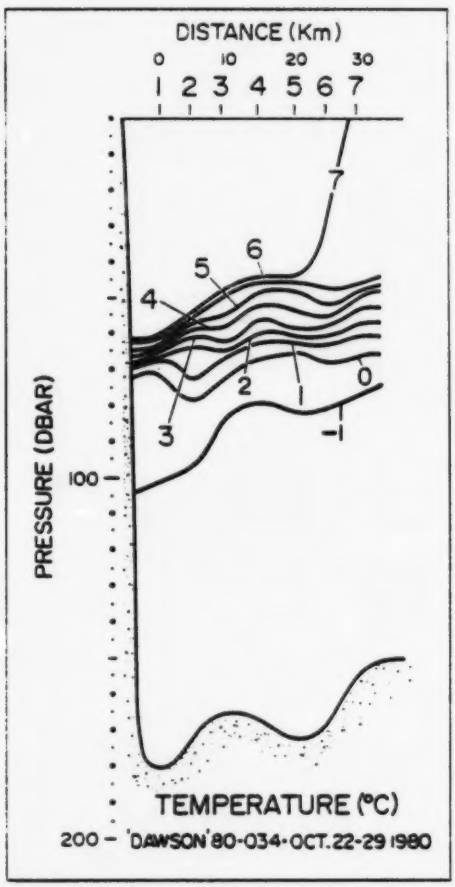
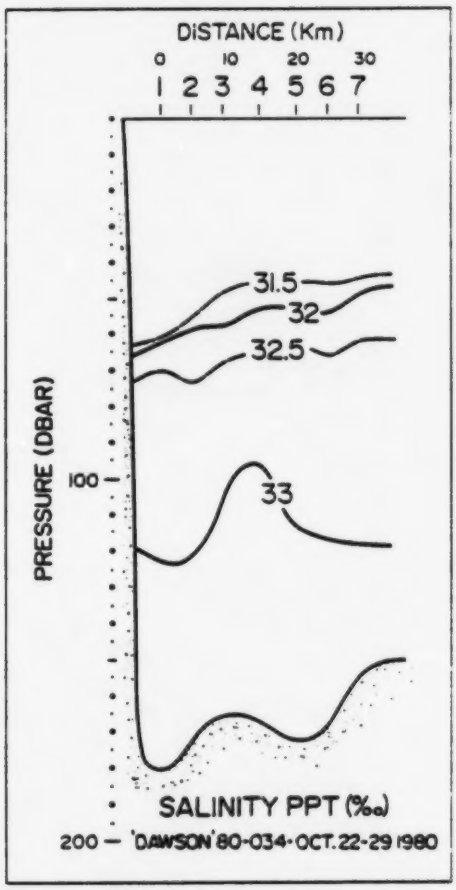
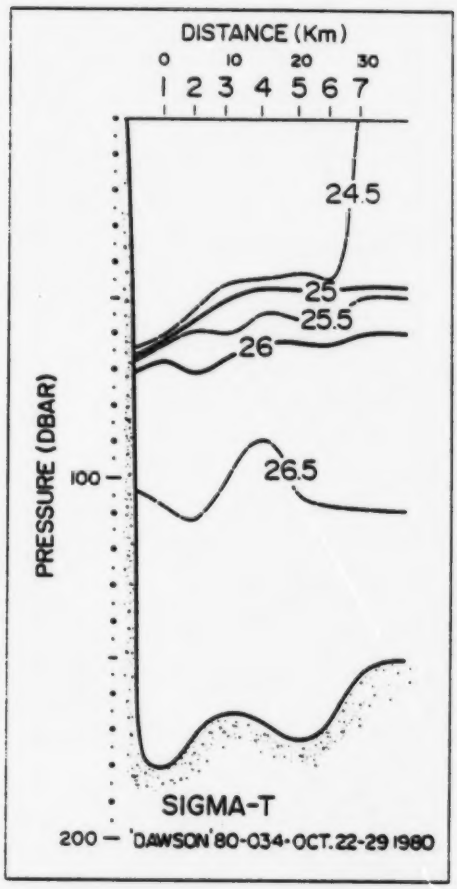



Figure 10 Position of stations 1-7


DISTANCE (Km)
0
10
20
30
1 2 3 4 5 6 7
7
6
5
4
3
2
1
0
-1
PRESSURE (DBAR)
100
200
TEMPERATURE (°C)
DAWSON 80-034-OCT. 22-29 1980


DISTANCE (Km)
0
10
20
30
1 2 3 4 5 6 7
31.5
32
32.5
33
PRESSURE (DBAR)
100
200
SALINITY PPT (‰)
'DAWSON' 80-034-OCT. 22-29 1980


DISTANCE (Km)
0
10
20
30
1 2 3 4 5 6 7
24.5
25
25.5
26
26.5
PRESSURE (DBAR)
100
200
SIGMA-T
'DAWSON' 80-034-OCT. 22-29 1980

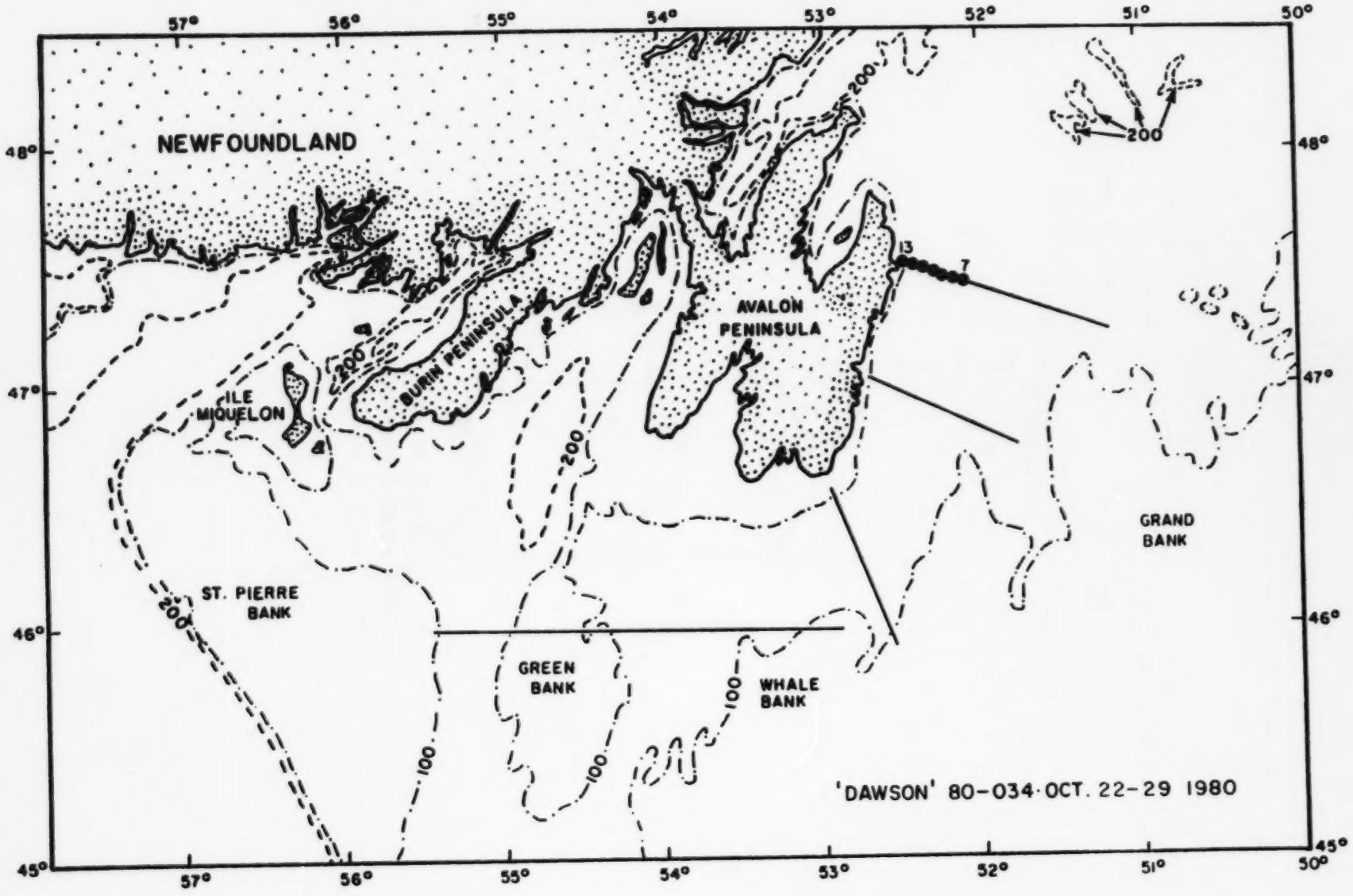
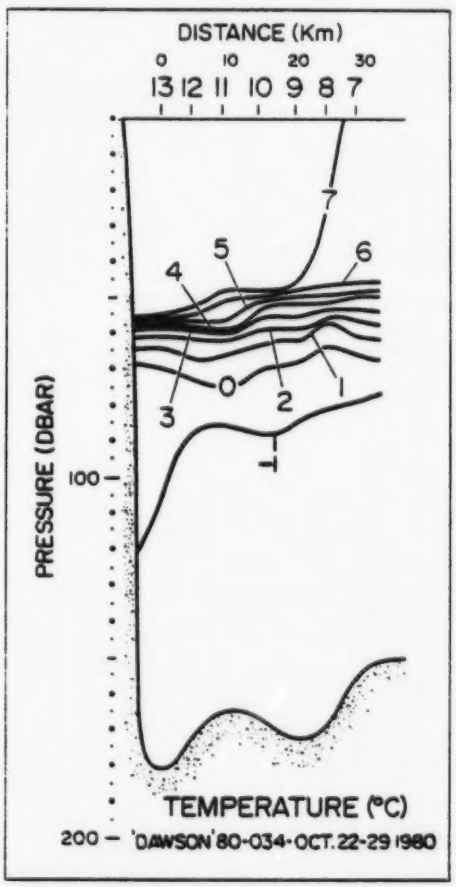
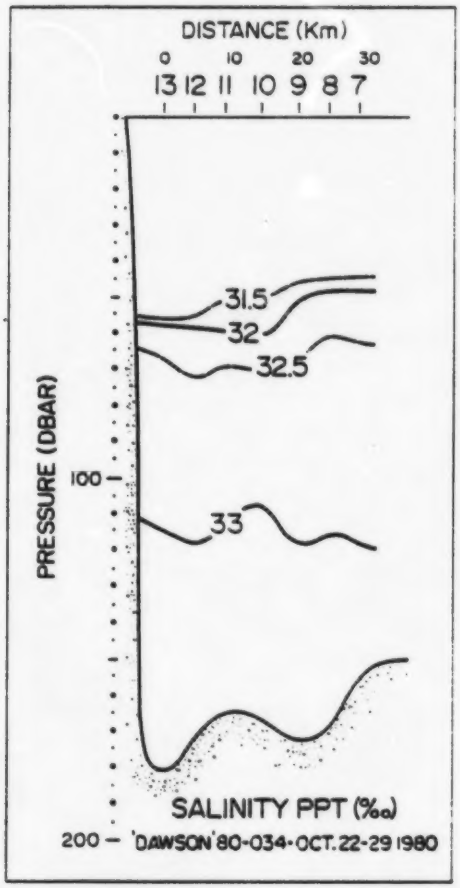
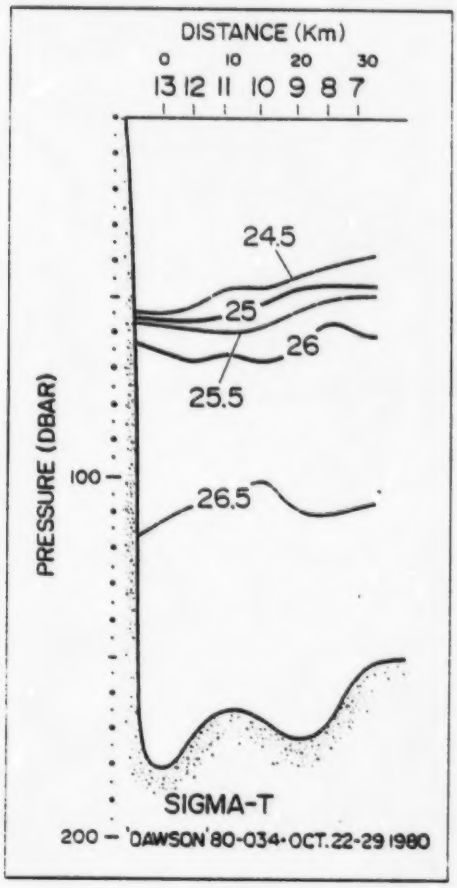



Figure 11 Position of stations 7-13


DISTANCE (Km)
0
10
20
30
13 12 11 10 9 8 7
7
5
6
4
0
2
1
3
1
PRESSURE (DBAR)
100
200
TEMPERATURE (°C)
'DAWSON' 80-034-OCT. 22-29 1980


DISTANCE (Km)
0
10
20
30
13 12 11 10 9 8 7
31.5
32
32.5
33
PRESSURE (DBAR)
100
200
SALINITY PPT (‰)
'DAWSON'80-034-OCT.22-29 1980


DISTANCE (Km)
0
10
20
30
13 12 11 10 9 8 7
24.5
25
26
25.5
26.5
PRESSURE (DBAR)
100
200
SIGMA-T
'DAWSON' 80-034-OCT. 22-29 1980

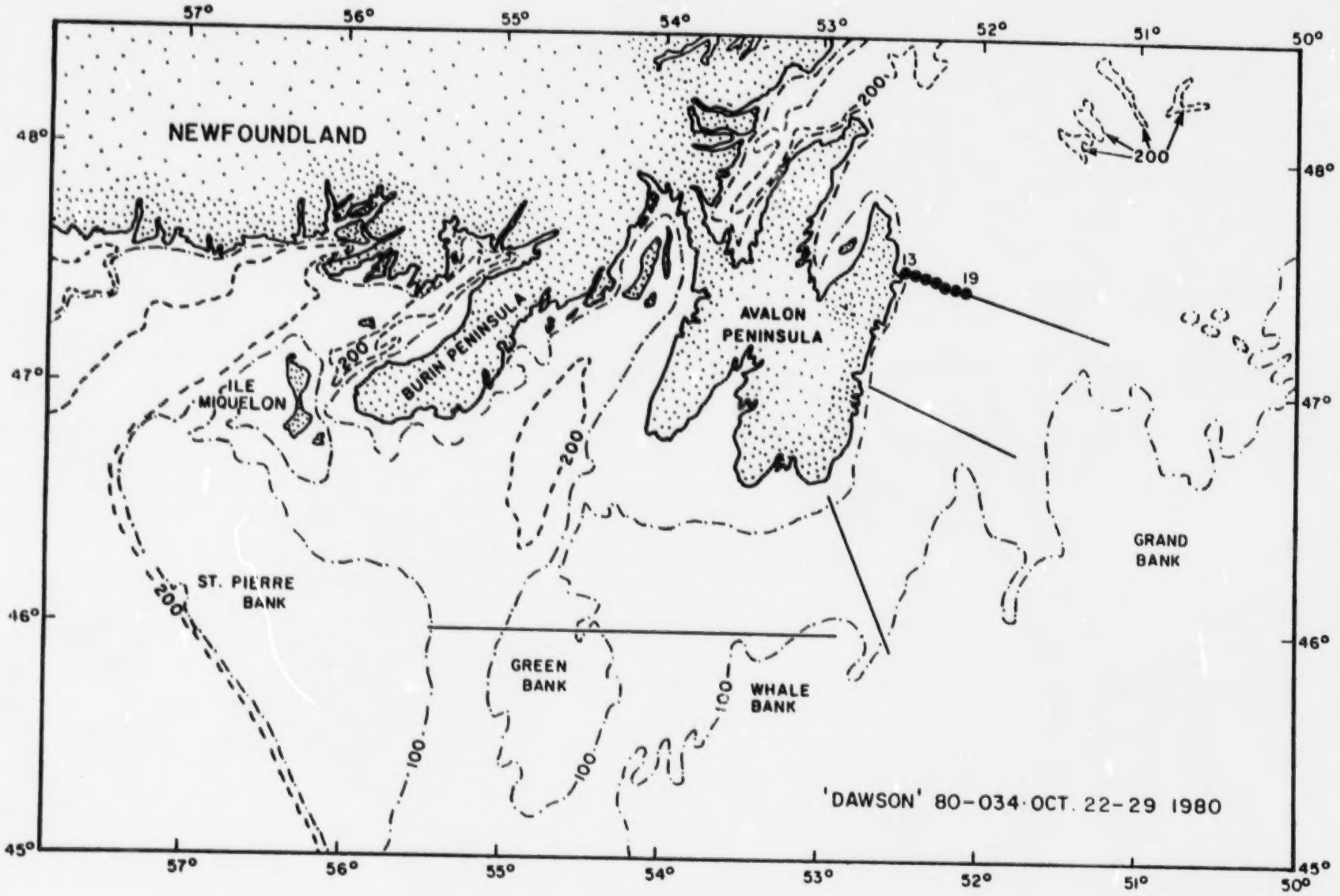
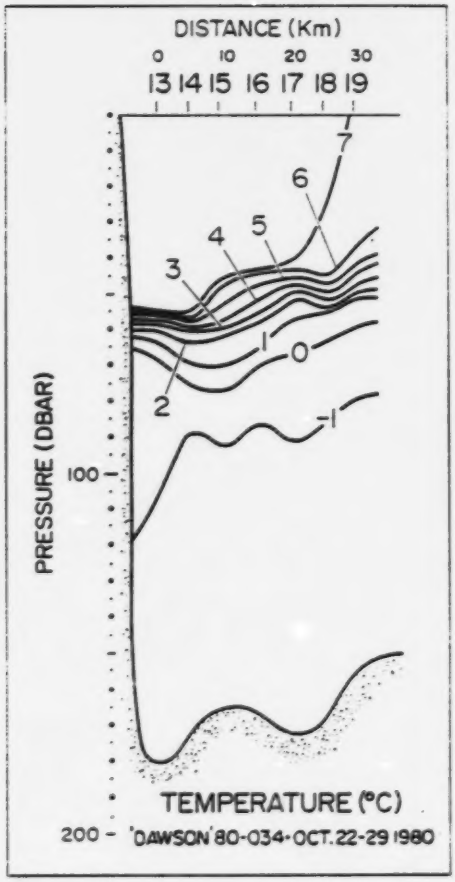
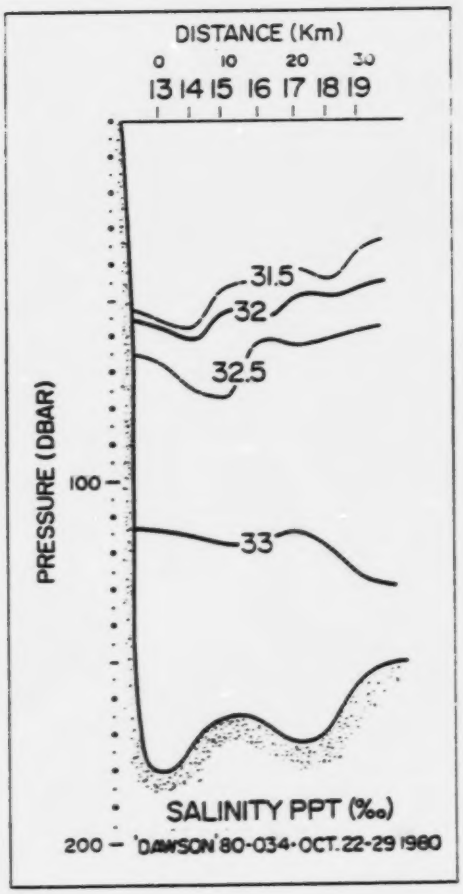
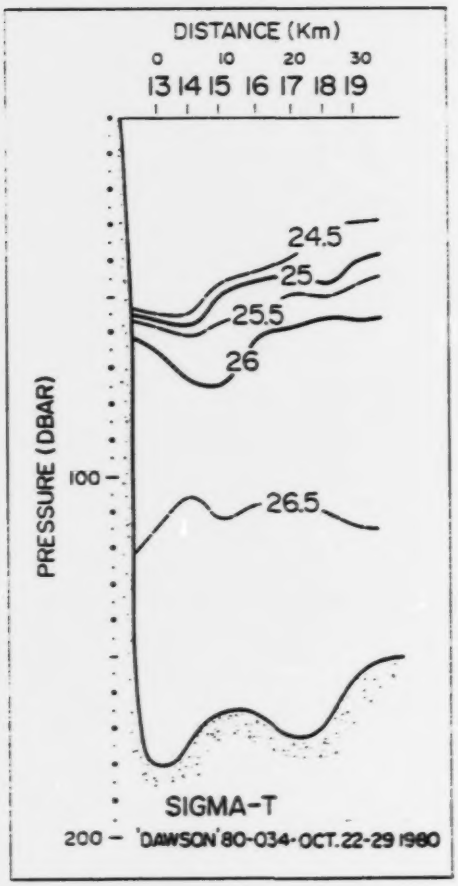



Figure 12 Position of stations 13-19


DISTANCE (Km)
0
10
20
30
13 14 15 16 17 18 19
7
6
5
4
3
2
1
0
-1
PRESSURE (DBAR)
100
200
TEMPERATURE (°C)
'DAWSON' 80-034-OCT. 22-29 1980


DISTANCE (Km)
0
10
20
30
13 14 15 16 17 18 19
31.5
32
32.5
33
PRESSURE (DBAR)
100
200
SALINITY PPT (‰)
'DAWSON' 80-034-OCT. 22-29 1960


DISTANCE (Km)
0
10
20
30
13 14 15 16 17 18 19
24.5
25
25.5
26
26.5
PRESSURE (DBAR)
100
200
SIGMA-T
'DAWSON' 80-034-OCT. 22-29 1980

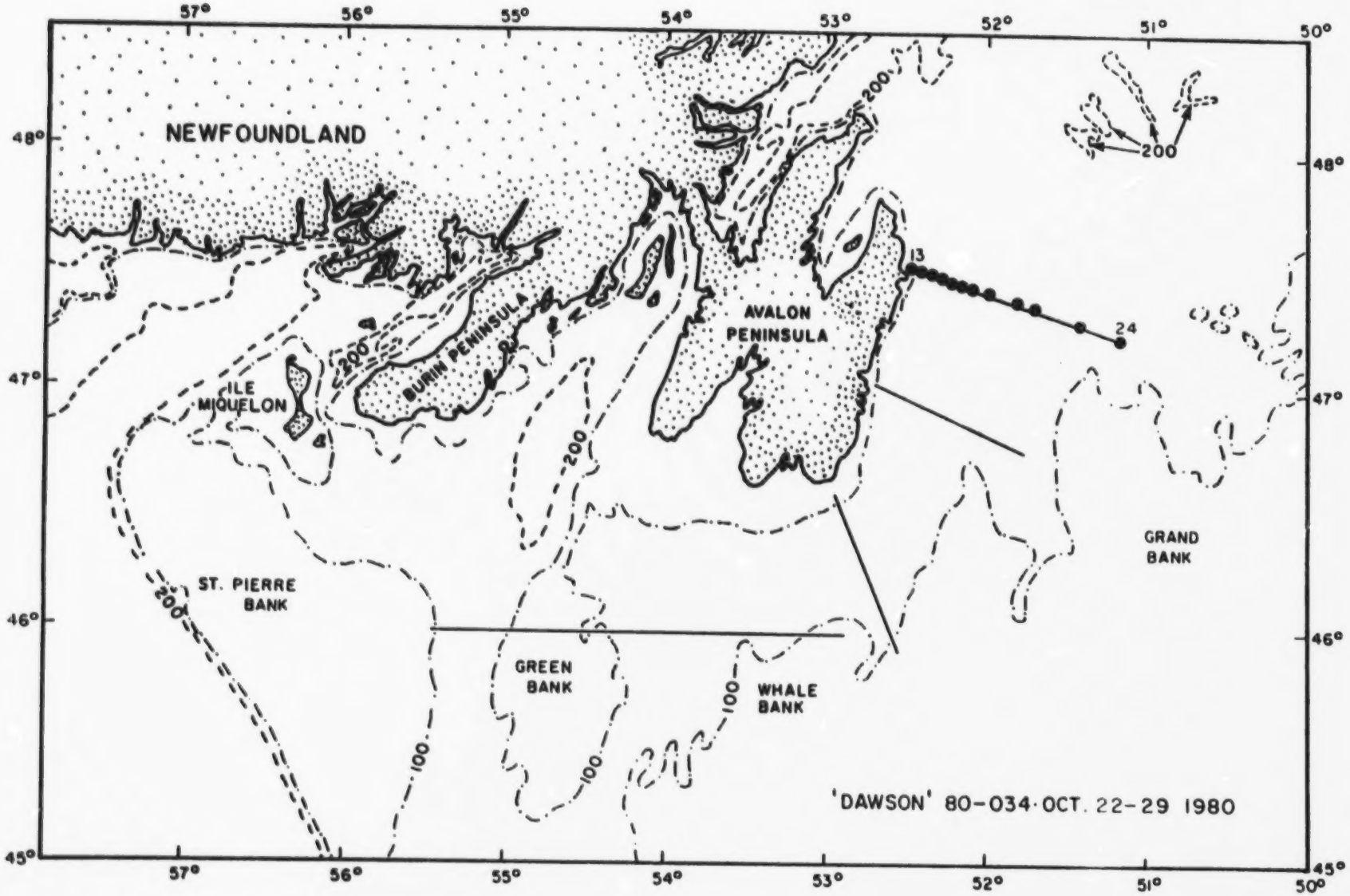
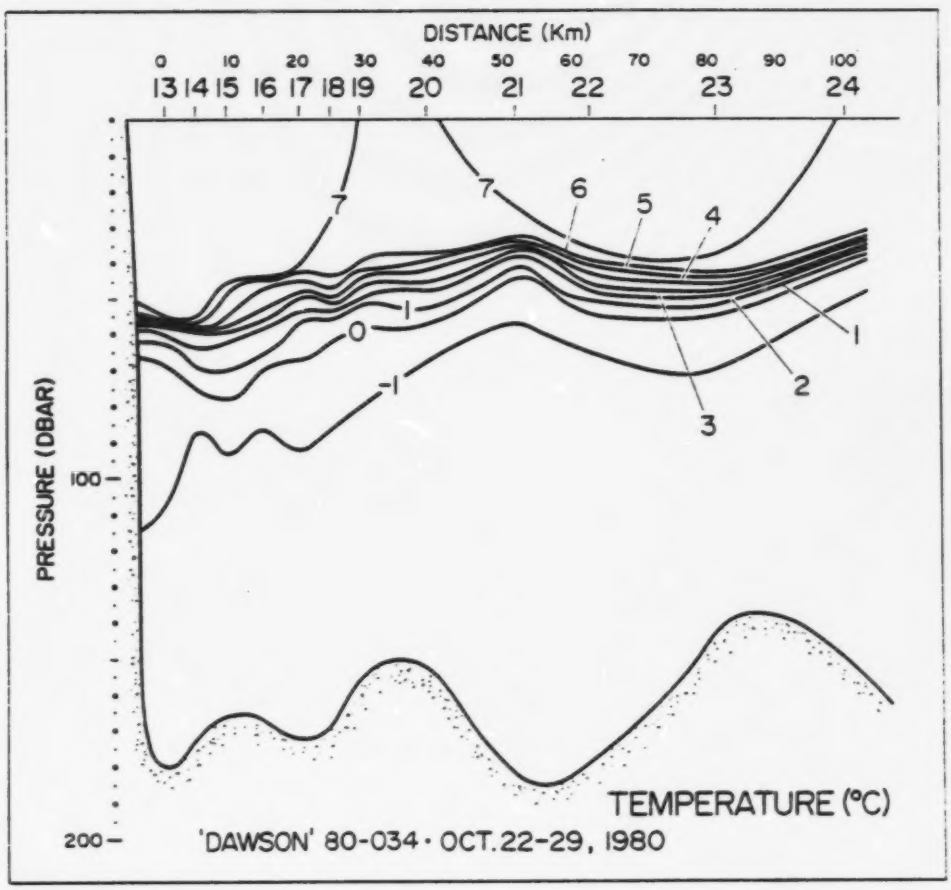
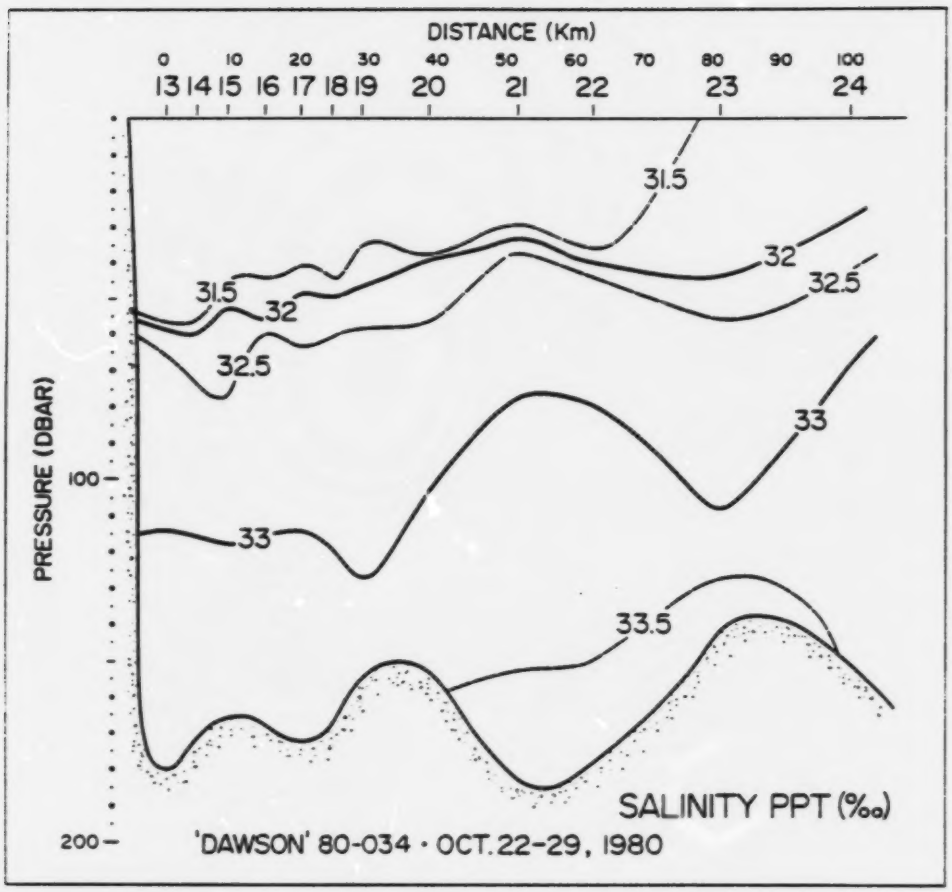
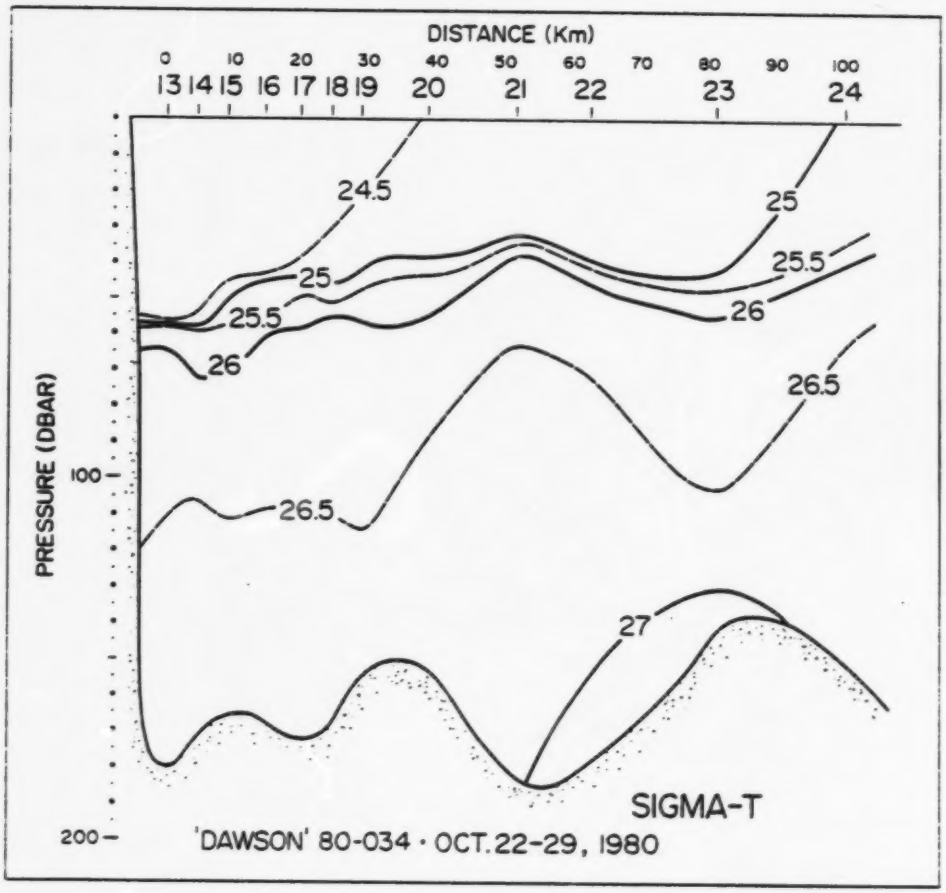



Figure 13 Position of stations 13-24


DISTANCE (Km)
0 10 20 30 40 50 60 70 80 90 100
13 14 15 16 17 18 19 20 21 22 23 24
7
7
6
5
4
1
0
-1
1
2
3
PRESSURE (DBAR)
100
200
TEMPERATURE (°C)
'DAWSON' 80-034 · OCT. 22-29, 1980


DISTANCE (Km)
0 10 20 30 40 50 60 70 80 90 100
13 14 15 16 17 18 19 20 21 22 23 24
31.5
32
32.5
31.5
32
32.5
33
33
33.5
PRESSURE (DBAR)
100
200
SALINITY PPT (‰)
'DAWSON' 80-034 · OCT. 22-29, 1980


DISTANCE (Km)
0 10 20 30 40 50 60 70 80 90 100
13 14 15 16 17 18 19 20 21 22 23 24
24.5
25
25
25.5
25.5
26
26
26.5
26.5
27
PRESSURE (DBAR)
100
200
SIGMA-T
'DAWSON' 80-034 · OCT. 22-29, 1980

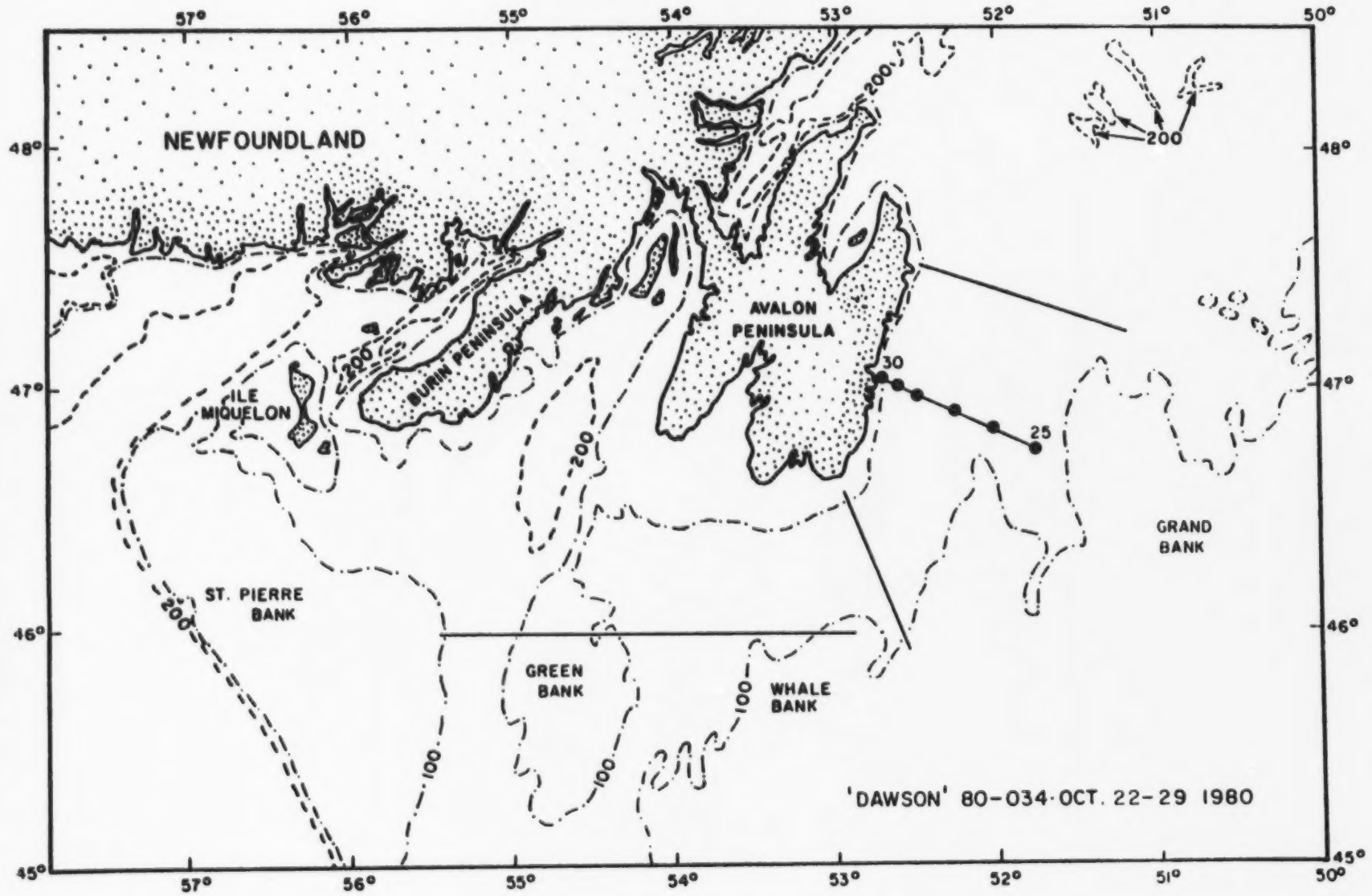
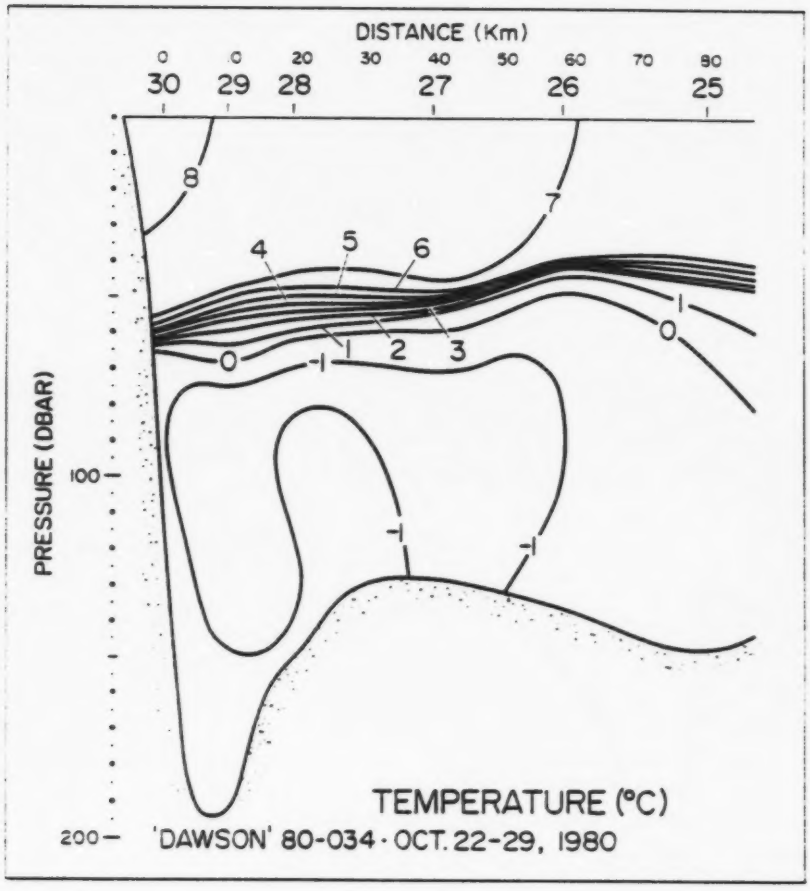
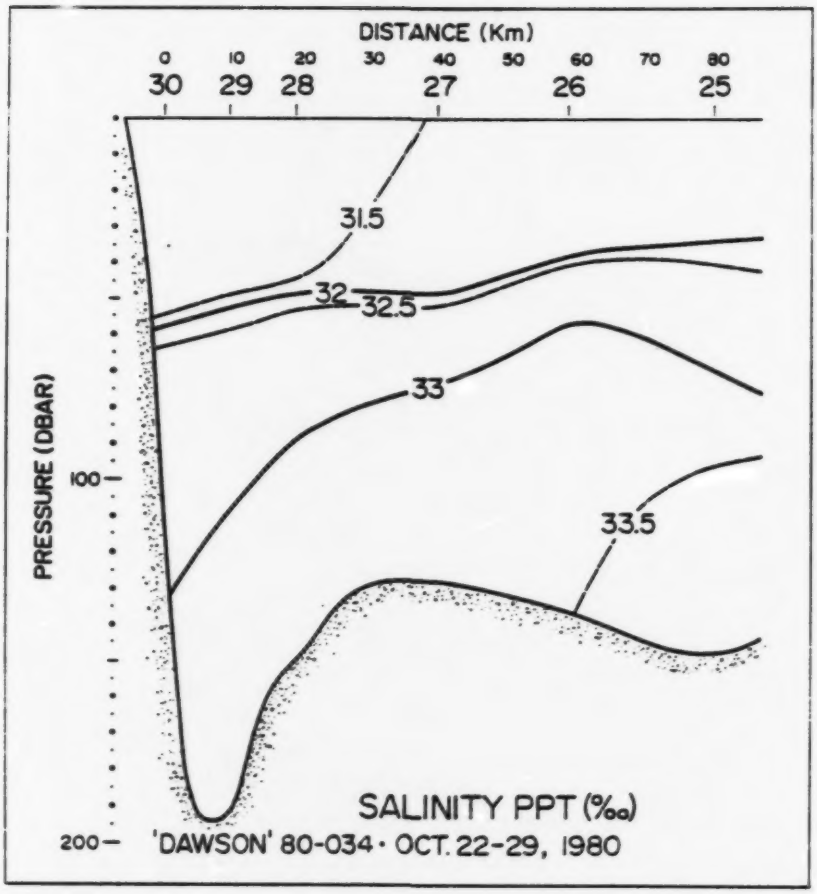
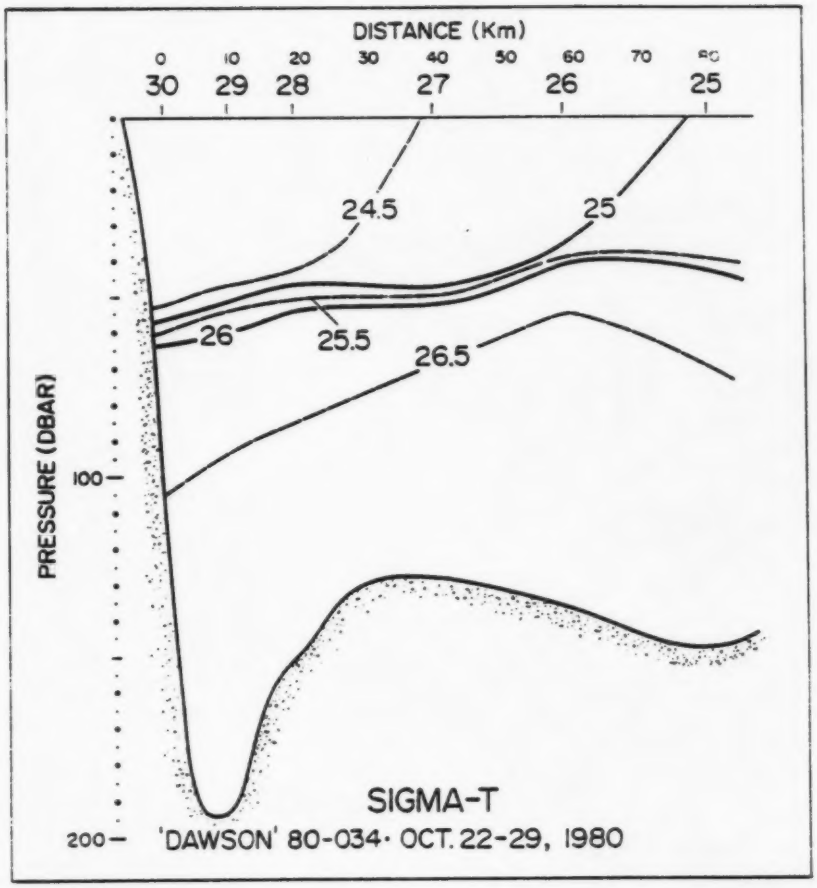



Figure 14 Position of stations 25-30


DISTANCE (Km)
0 0 20 30 40 50 60 70 80
30 29 28 27 26 25
8
7
4 5 6
1
0
0 -1 1 2 3
PRESSURE (DBAR)
100
-1
-1
200
TEMPERATURE (°C)
'DAWSON' 80-034 · OCT. 22-29, 1980


DISTANCE (Km)
0
10
20
30
40
50
60
70
80
30
29
28
27
26
25
31.5
32
32.5
33
33.5
PRESSURE (DBAR)
100
200
SALINITY PPT (‰)
'DAWSON' 80-034 · OCT. 22-29, 1980


DISTANCE (Km)
0
10
20
30
40
50
60
70
80
30
29
28
27
26
25
24.5
25
26
25.5
26.5
PRESSURE (DBAR)
100
200
SIGMA-T
'DAWSON' 80-034· OCT. 22-29, 1980

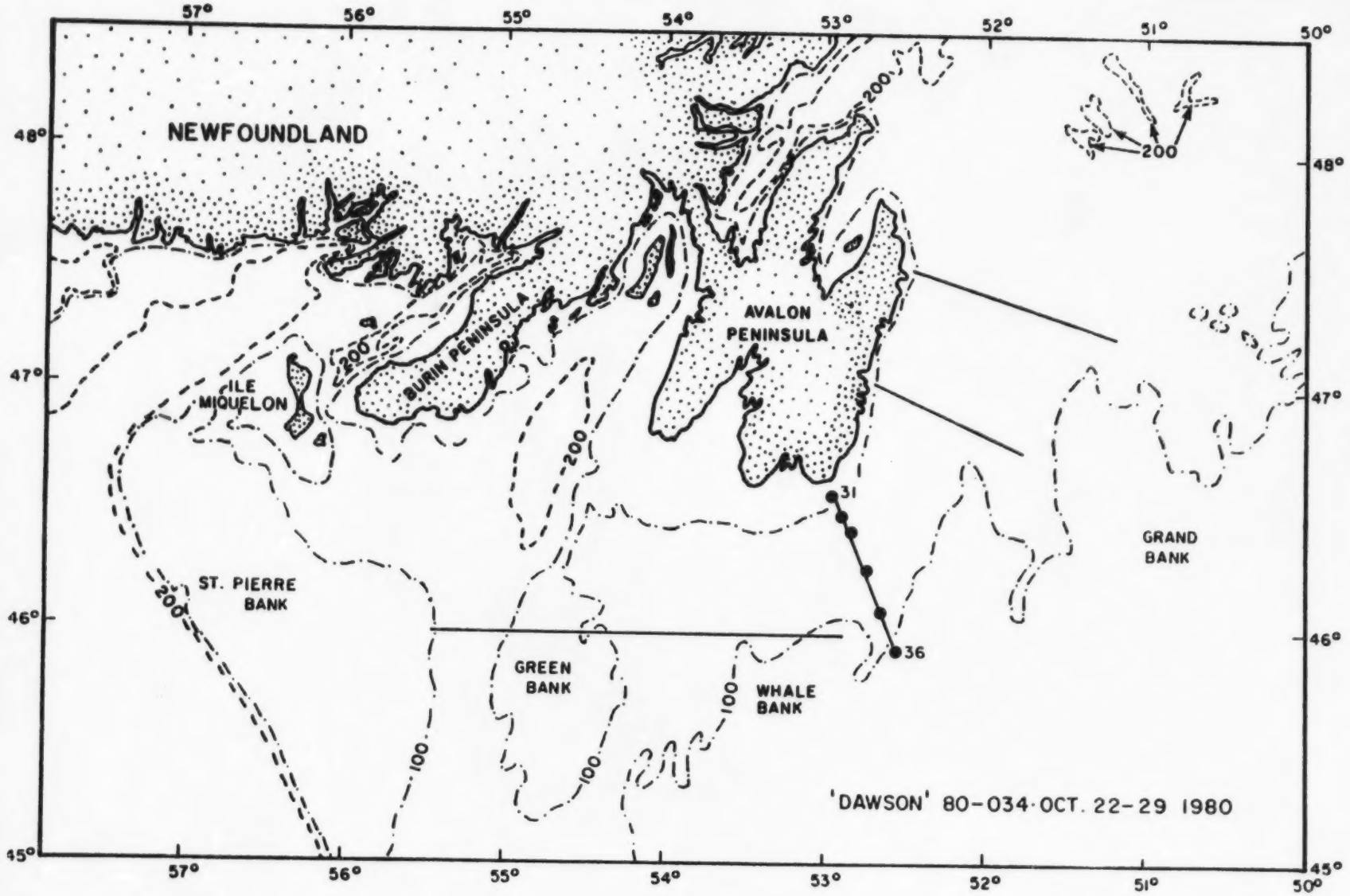
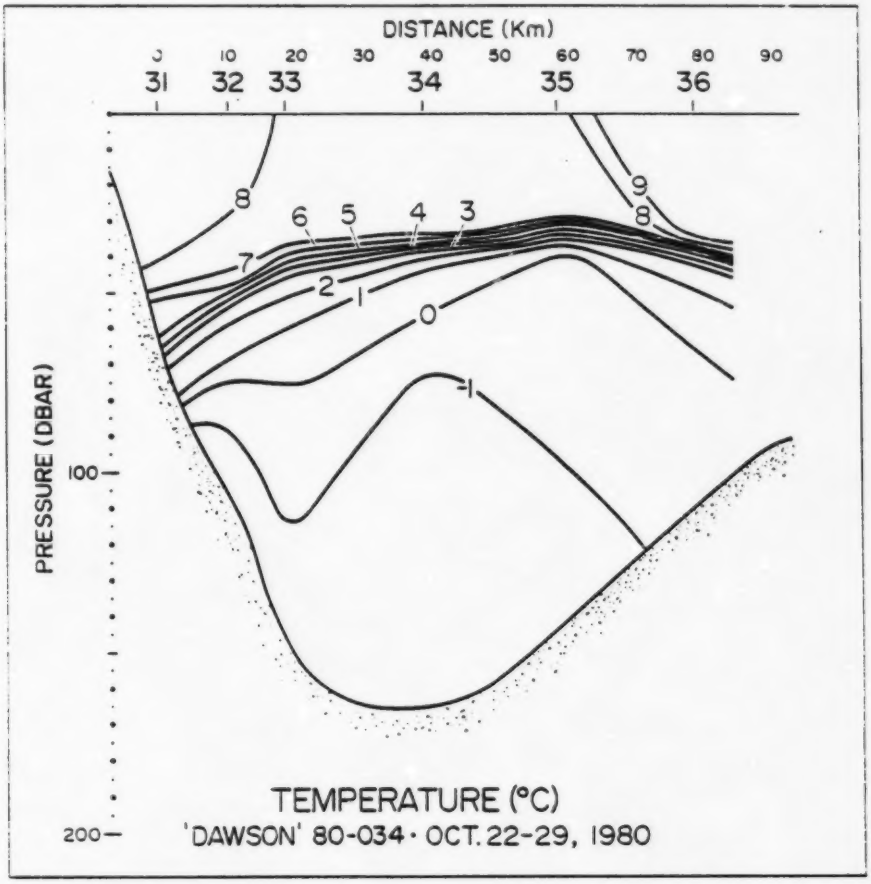
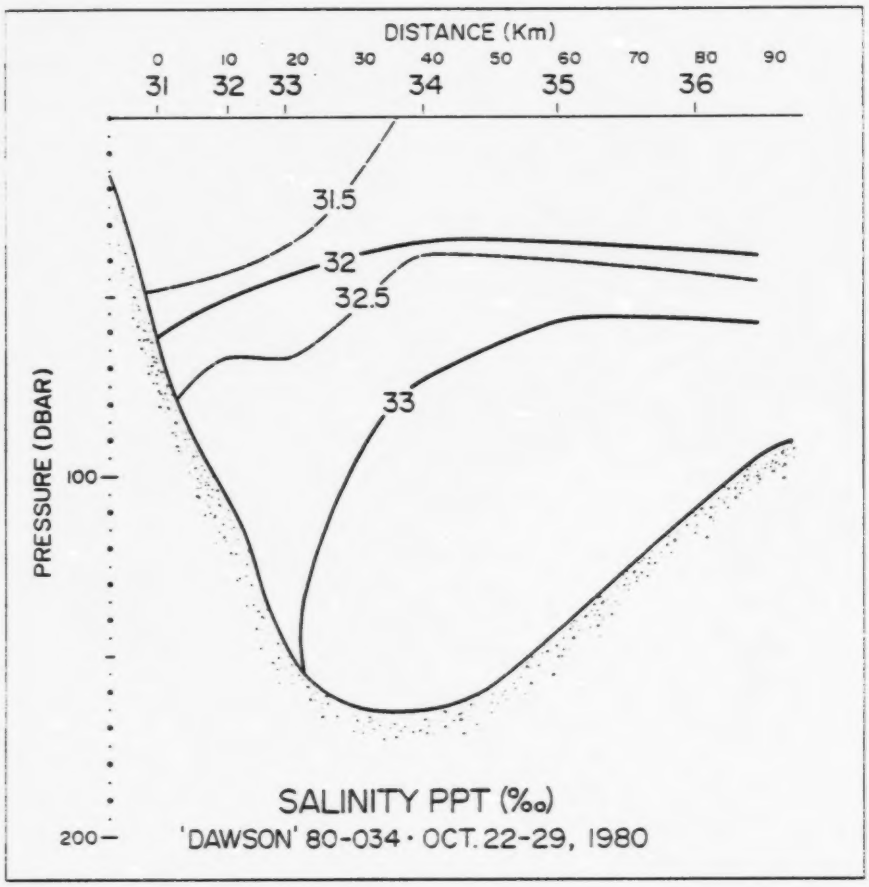
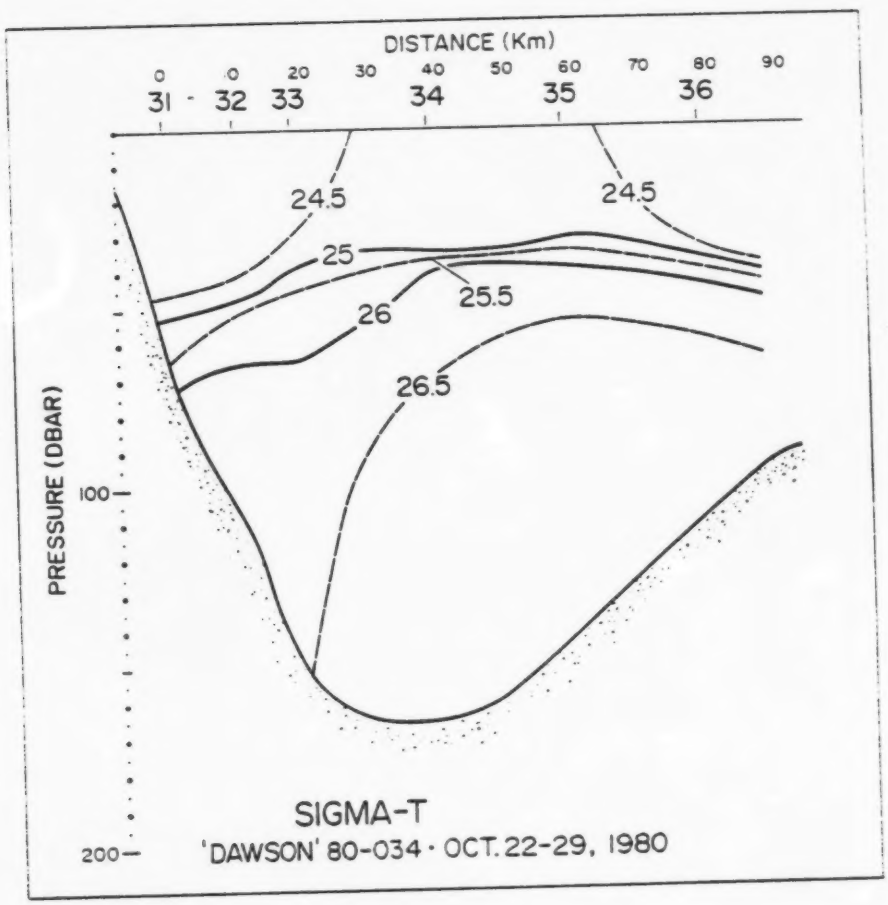



Figure 15 Position of stations 31-36


DISTANCE (Km)
0 10 20 30 40 50 60 70 80 90
31 32 33 34 35 36
8
6 5 4 3
9
8
7
2
1
0
-1
PRESSURE (DBAR)
100
200
TEMPERATURE (°C)
'DAWSON' 80-034 · OCT. 22-29, 1980


DISTANCE (Km)
0
10
20
30
40
50
60
70
80
90
31
32
33
34
35
36
31.5
32
32.5
33
PRESSURE (DBAR)
100
200
SALINITY PPT (‰)
'DAWSON' 80-034 · OCT. 22-29, 1980


DISTANCE (Km)
0
0
20
30
40
50
60
70
80
90
31
32
33
34
35
36
24.5
24.5
25
25.5
26
26.5
PRESSURE (DBAR)
100
200
SIGMA-T
'DAWSON' 80-034 · OCT. 22-29, 1980

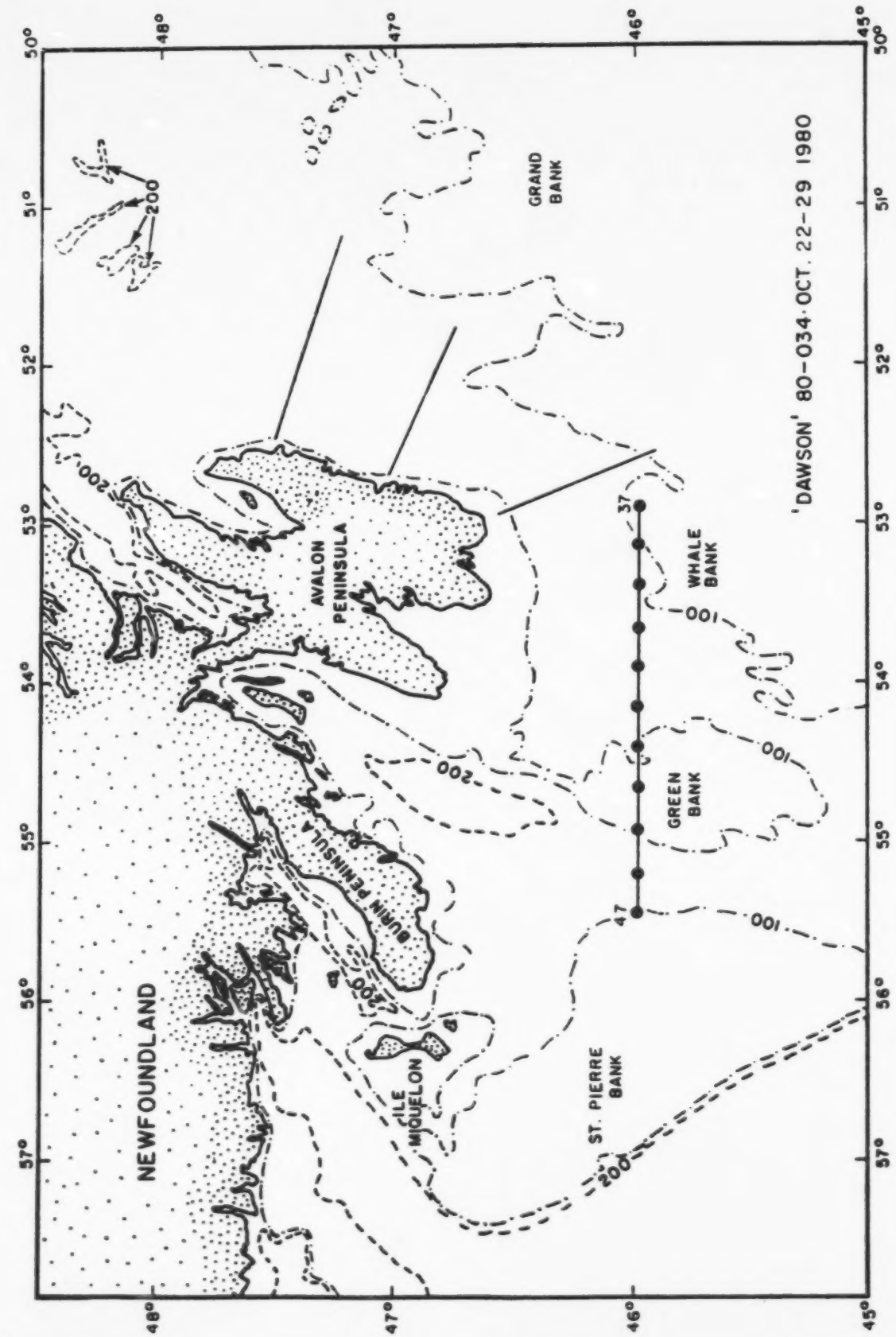
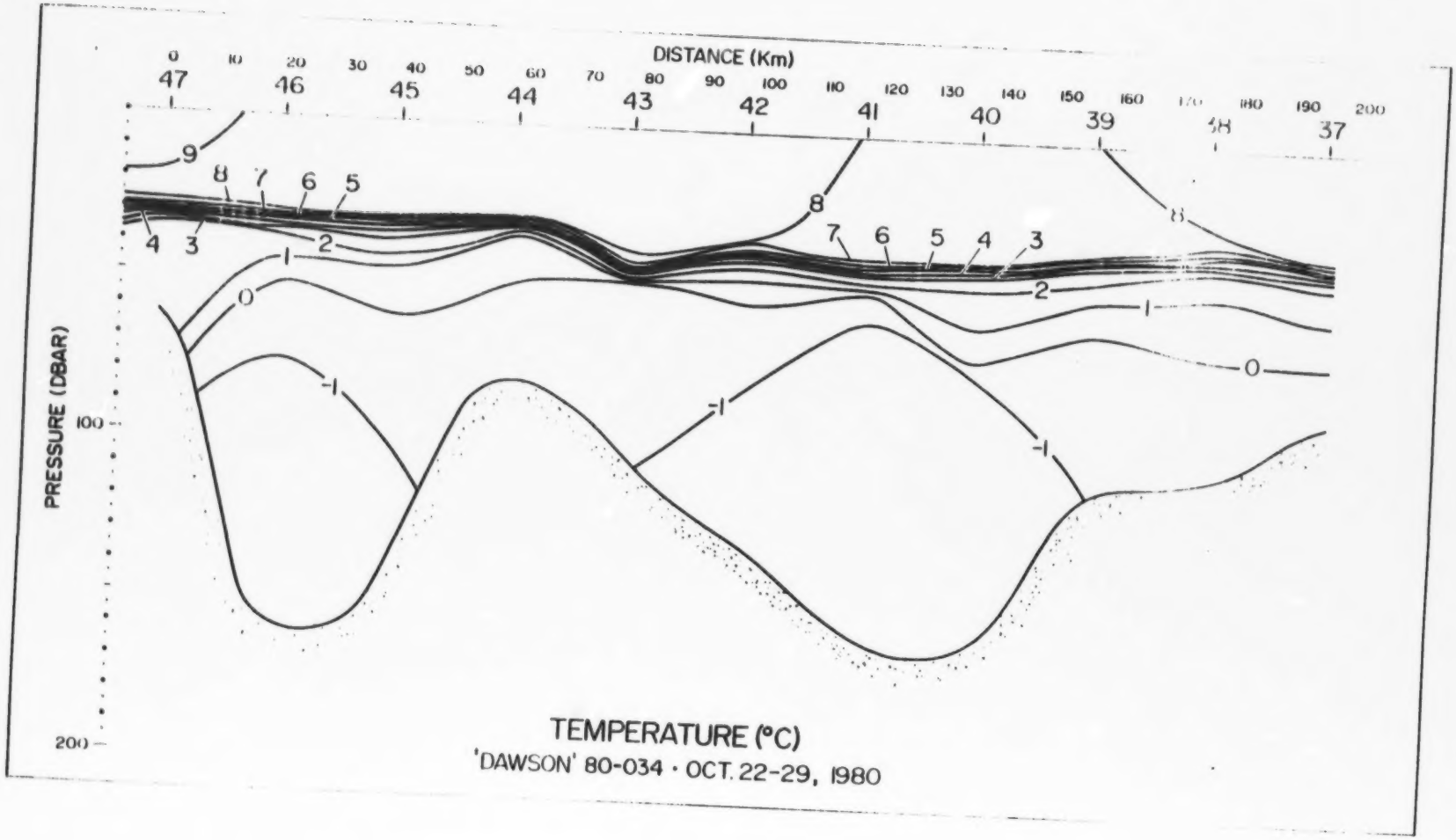
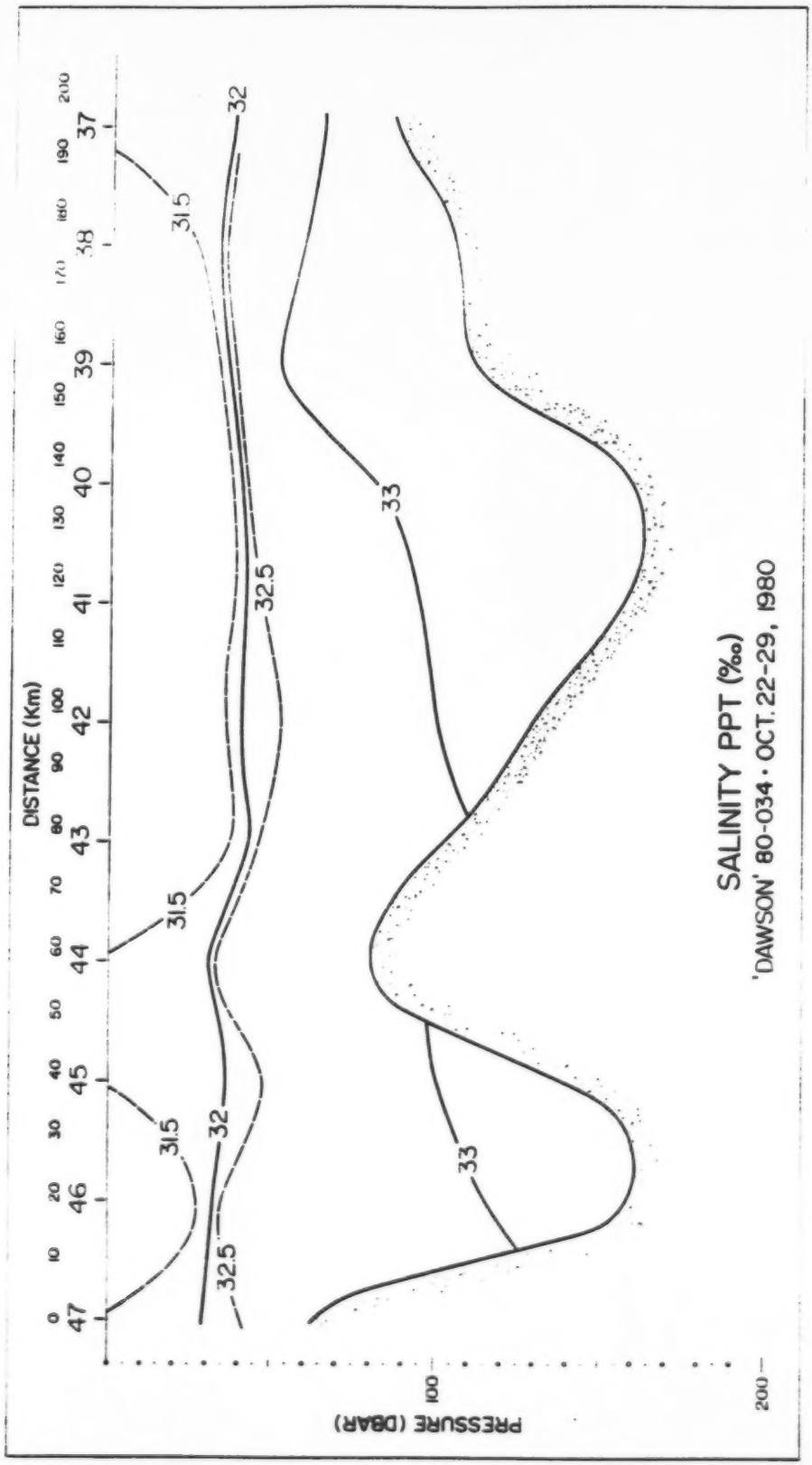
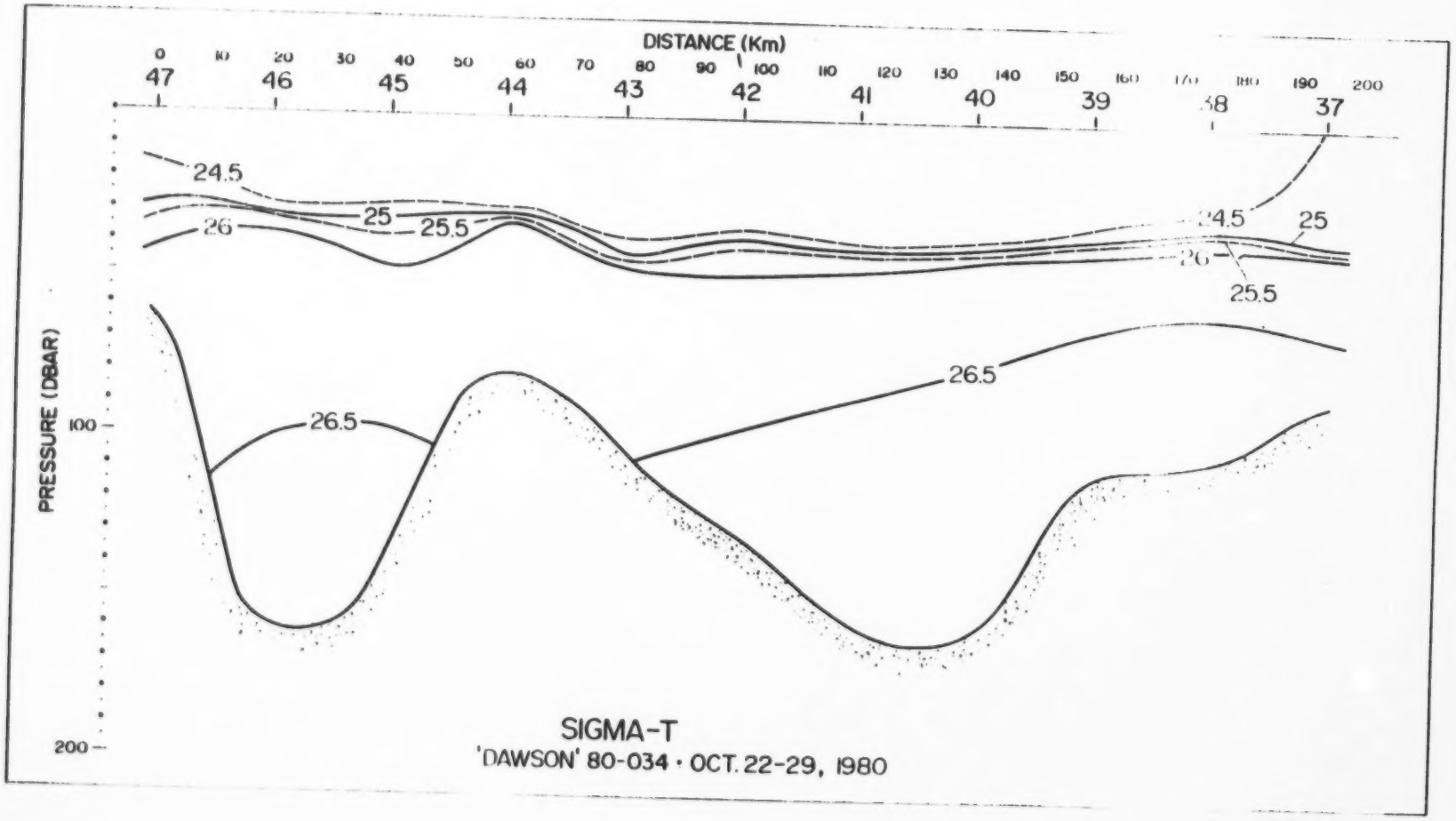



Figure 16 Position of stations 37-47


DISTANCE (Km)
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200
47 46 45 44 43 42 41 40 39 38 37
PRESSURE (DBAR)
100
200
TEMPERATURE (°C)
'DAWSON' 80-034 · OCT. 22-29, 1980


SALINITY PPT (‰)
'DAWSON' 80-034 • OCT. 22-29, 1980
DISTANCE (Km)
PRESSURE (DBAR)
31.5
32
32.5
33


DISTANCE (Km)
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200
47 46 45 44 43 42 41 40 39 38 37
24.5
25
25.5
26
24.5
25
26
25.5
26.5
26.5
PRESSURE (DBAR)
100
200
SIGMA-T
'DAWSON' 80-034 · OCT. 22-29, 1980